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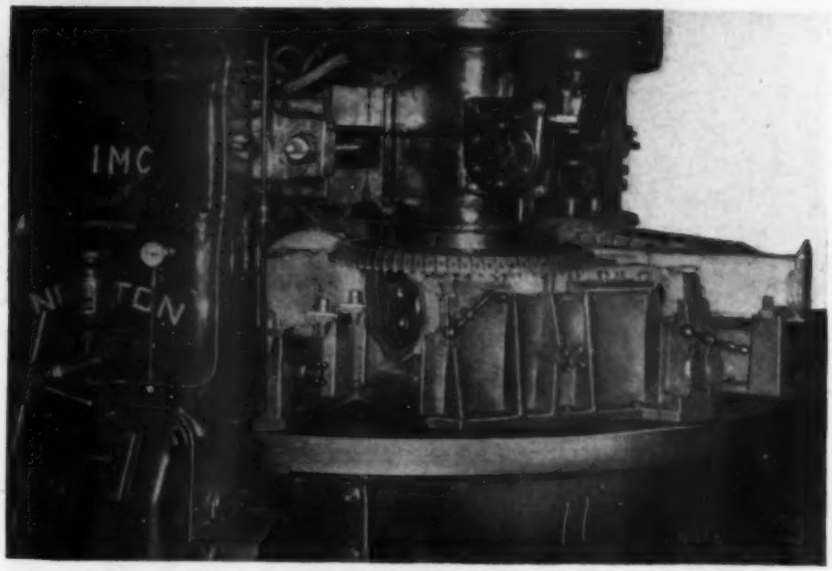
Franklin Crankcases and Multi-Purpose Tools



Alternate fixtures on this Newton miller are used for holding crankcases while top and bottom faces are roughed and finished by three cutters

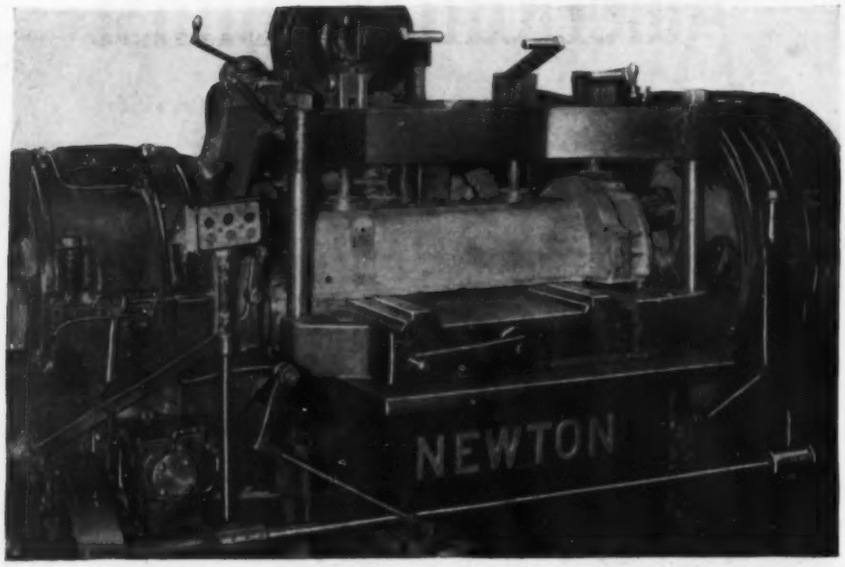
O. R. Miller
Production Manager,
H. H. Franklin Manufacturing Company

As versatile as Yankee whittlers, these machine tools employ new methods and new set-ups in the manufacture of the pioneer air-cooled car. Two additional exclusive articles on other phases of Franklin production will appear in early issues

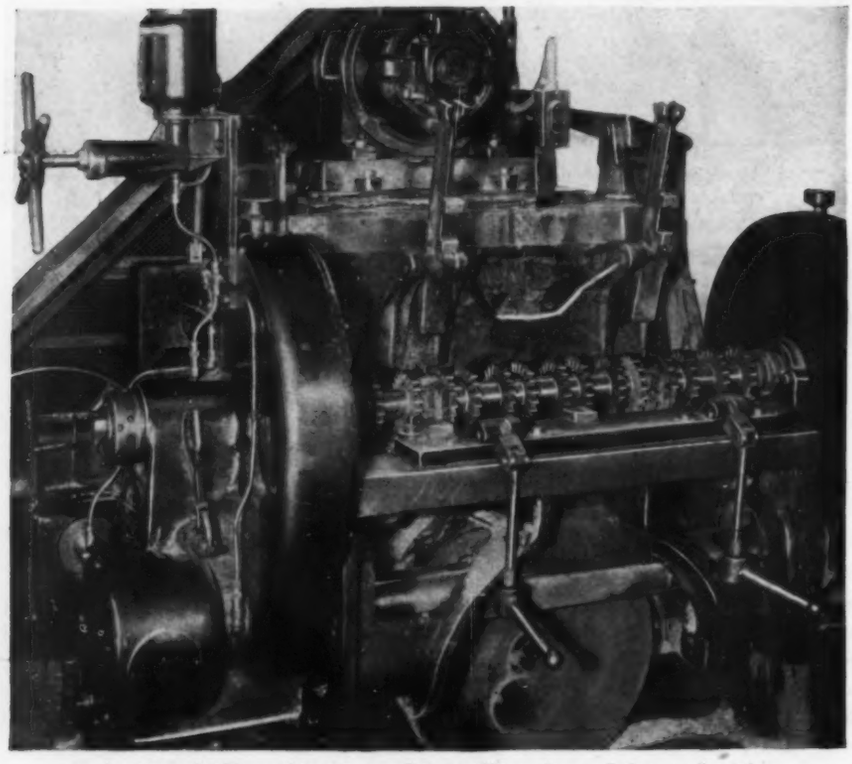
BECAUSE two or more operations are performed simultaneously by one tool wherever feasible, our aluminum crankcases are put through a surprisingly small number of machine tools. The lower flange of the case for securing the oil pan, the top surface to which cylinders are bolted, the front face mating with a chain case cover, and the rear face for the fly-wheel housing all are milled flat.

In the first machining operation, the case is held in a special fixture bottom up, the flange which overhangs the case being supported on several pins in the fixture. Three small flat pads cast on this flange serve as initial locating points and bear against three fixed pins. Two of these pads are near the ends of the flange at one side and one at the center of the flange on the other side of the case. When clamped against these pins, several other movable pins, positioned by screw-actuated wedges, are moved up until they bear against the flange and then are locked securely. They support the flange against distortion while it is fed under the vertical-spindle end mills of a Newton horizontal rotary-bed milling machine. There are eight fixtures on the bed of this machine, four supporting four cases for the bottom flange milling, and four others, spaced alternately with the first four, carrying four other cases for top face milling. Each of the castings is passed successively under two milling cutters at one side of the bed and a single cutter at the other side. The first two of these cutters, located side by side, do the roughing operation, and the second cutter, which is 32 in. in diameter, makes the finishing cut. All three have inserted blades of high-speed steel.

After making the first circuit of the table and having its under-face milled flat, the casting is turned over into an adjacent fixture on the same bed, where it is located and held securely against the face already finished. It then makes the second trip under the same three cutters



Five simultaneous operations on end faces including the faces against which the starter and generator are mounted are done on this planetary milling machine



A rise-and-fall machine is used in milling the end faces of main bearings

and the top face, against which the cylinders rest, is rough- and finish-milled. Operations on both bottom and top faces proceed continuously and simultaneously, alternate fixtures holding the case in respective positions for milling bottom and top surfaces. Initial loading of the castings and reloading for the second cut is handled by a single operator who also unloads the finished castings after they have passed the third cutter the second time. In this machine the table rotates twice in 15 minutes, doing a total of eight operations, or four cases machined top and bottom in this time.

In the succeeding operation, the flat surfaces against which the main bearing caps are bolted are finished in a horizontal Cincinnati Hydromatic milling machine. Cases then are passed to a two-way multiple drill which simultaneously drills all holes in the bottom and right side of the case. For this operation the case is placed bottom up on a bed where it is clamped securely against the back bushing plate that guides the horizontal drills before the bush plate for the vertical spindle drills is lowered in place. Two holes, one near each end of the case, drilled in this operation are used for locating the case in nearly all succeeding operations. Independent nose adjustment is provided on all the drills so that the correct depth of hole can be maintained in all cases.

Following this drilling the case is passed to a Newton planetary mill which performs five operations simultaneously. This machine has a Texrope drive and is fitted with two planetary heads, one at each end of the case. A third head at the back finishes the faces against which the starter and generator are mounted. These faces are on the inner side of the flanged ends of the case. At the same time, one of the planetary mills finishes the outer face of the chain case flange, while the other planetary head, fitted with two spindles, finishes respectively the flange to which the bell housing is attached and the rear face of the rear main bearing. With a single operator this machine does what it would normally take three milling machines and three operators to accomplish. The planetary heads are carried on rotating drums that have, respectively, one and two spindles carrying cutters which rotate on their own axis in addition to turning with the drum. The third head at the rear has an Oil-Gear drive giving quick return to the loading position when the cut is completed.

A Newton rise-and-fall type of miller here illustrated is the machine employed for performing the succeeding operation, namely, that of straddle milling the end faces of all main bearing seats, the milling cutters being carried on a long arbor. The case itself is mounted on a cam-operated table which rises against the cutter and lowers automatically when the cut is completed. The same operator who handles the planetary mill already mentioned is able to run this miller also, as the operations on

both machines are fully automatic, once the work is loaded.

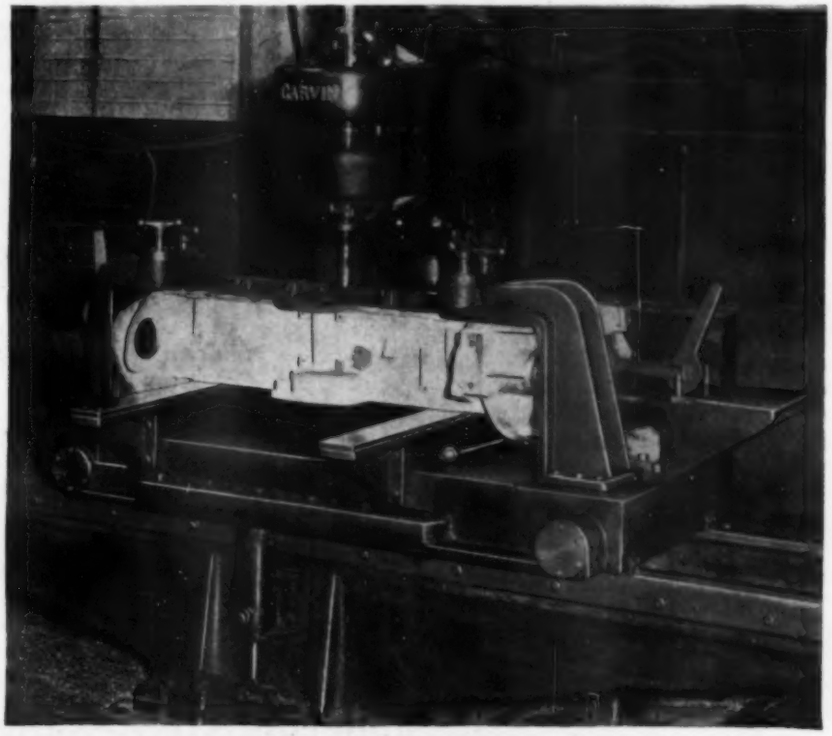
Two drilling operations follow in order after the two milling operations just referred to. In the first of these, the case is drilled on two ends, the top, and the right side on a four-way Foot Burt multiple-spindle machine, which drills all remaining small holes required on the surfaces named. This machine is fitted with a hydraulic feed. The second drilling operation is done on another Foot Burt drill which bores twelve $1\frac{1}{32}$ holes to receive the push rod tubes, and certain other large diameter holes having axes at right angles to the top face. All holes in the top face that require threading are then tapped on a third Foot Burt drill fitted with floating spindle taps.

Several of the larger holes on the under side of the case are then tapped in a Garvin single-spindle tapper fitted with a special sliding bed on rollers which is indexed automatically to locate it in position for each successive hole. The holes tapped in this operation are those for holding the main bearing cap studs and must be accurately located. There are, of course, two rows of these holes, one row being tapped in the first transverse position of the bed and the second row in the second transverse position, using Natco floating holders.

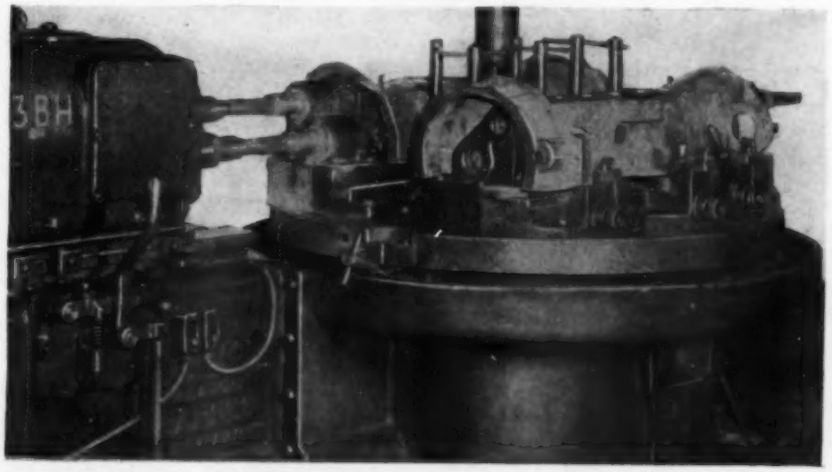
One of the most particular and important operations on the crankcase is the boring of main bearing and camshaft bearing holes. This work is done on a W. F. & J. Barnes horizontal boring mill fitted with a rotary table, the center of which is offset from the head. There are two work positions on this table, hence one crankcase can be loaded, clamped in position, and the boring bars inserted, while the other case is being bored. The table then is swung through 180 deg., the bars for rough boring are removed, and other bars for finished boring are inserted, after which the table is again shifted through 180 deg. for the finish-boring operation. At the same time this boring is progressing another case is loaded, and rough boring bars put in place.

When the boring bars are being inserted, the case itself is elevated about an inch on four rising pins operated by a lever. This permits the bar to slip into place readily without the flycutters fouling the cord holes. When the bars are in place, the work is lowered until it rests on three fixed supporting pads, after which it is clamped rigidly in place for the boring operation. The limits on the crankshaft bearings are 2.653 in. and 2.655 in. Main bearing bars have seven fly cutters and camshaft bars five cutters. All cutters are made from high-speed steel. Tungsten carbide has been tried for this operation but it was found that cutters were too easily nicked while being inserted in the case to make their use advisable. All the bearing holes rough- and finish-bored in this operation are hand-reamed to final size in a latter operation.

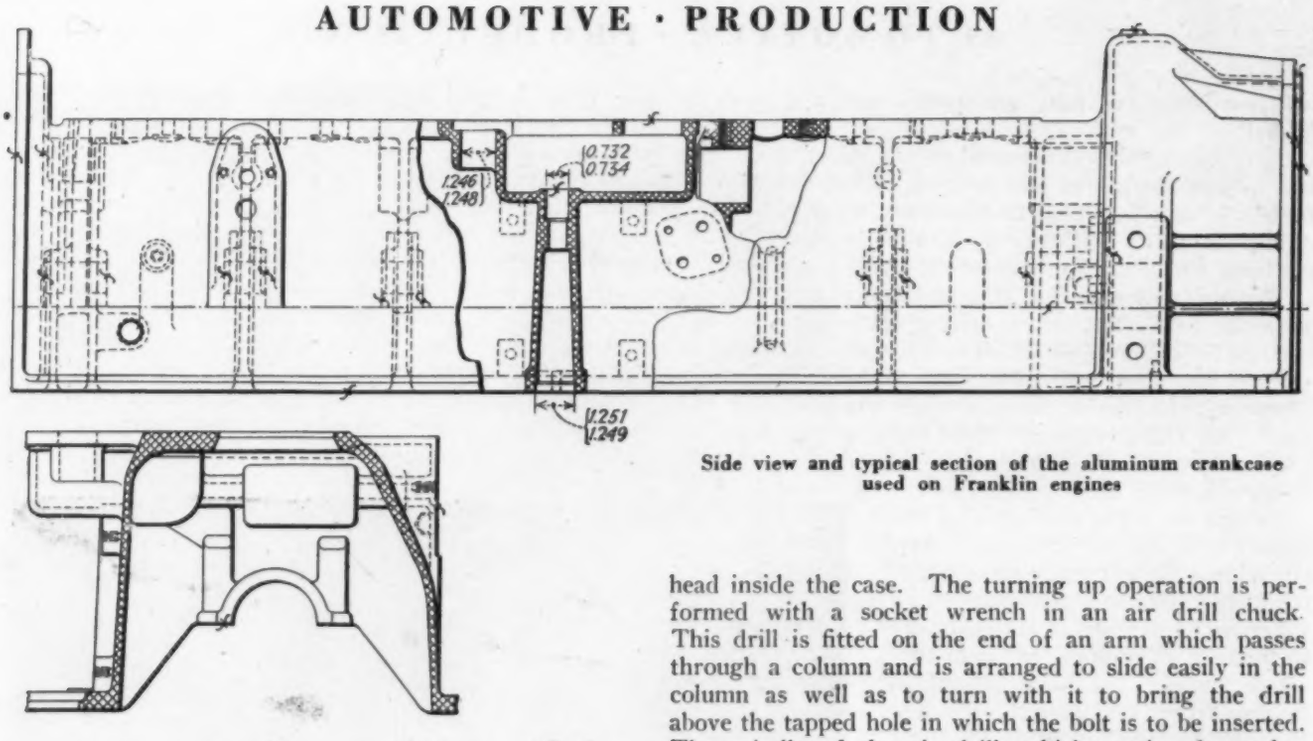
The final machining operation on the crankcase is the reaming of the holes for the bearings of the vertical shaft which carries the ignition head. These holes have to be held accurately in alignment and must be drilled one from the top and one from the bottom. The work is done on an ordinary vertical drill-press fitted with a



A Garvin single-spindle tapper fitted with a special indexing bed taps various holes in the underside of the crankcase



Main crankshaft and camshaft bearings are rough- and finish-bored on a W. F. & J. Barnes rotary table boring mill



Side view and typical section of the aluminum crankcase used on Franklin engines

special bed below which is mounted a Black & Decker electric drill carrying a reamer. When the case is in place the regular drill head is lowered carrying its reamer, and the Black & Decker drill is raised from below carrying the reamer for the lower hole.

At the end of the line on which the crankcase is machined is a station at which the 24 studs which hold the cylinders to the crankcase are inserted. Since the cylinders for an air-cooled engine are not cast in one block, but are mounted separately, each cylinder must be bolted to the crankcase, and since this is aluminum, an ordinary stud is not considered adequate. Heat-treated bolts which are threaded their full length close up under the head are therefore inserted with the bolt head inside the case. The turning up operation is performed with a socket wrench in an air drill chuck. This drill is fitted on the end of an arm which passes through a column and is arranged to slide easily in the column as well as to turn with it to bring the drill above the tapped hole in which the bolt is to be inserted. The spindle of the air drill, which carries the socket wrench employed, can be racked up and down with a lever, to follow the stud as it is driven home.

Prior to setting the crankcase in place on the fixture used to hold it during insertion of the bolts referred to, all of the bolts are placed in holes in cylindrical steel blocks mounted on the same centers as the holes cored in the crankcase top face through which the connecting rods project. With the bolts so positioned, heads up, the crankcase is set in place over the six cylindrical blocks after which the operator swings the pneumatic drill successively into position above each of the bolts picking them up with the socket wrench and then shifting them to the nearest tapped hole into which they are to be screwed, he uses the air drill to drive them home.

Soldering 18-8 Stainless

KENNETH T. MACGILL
Joseph T. Ryerson & Son, Inc.

CONTRARY to general belief, "stainless" alloys can be soldered easily and well. Joints in Allegheny Metal have shown as high as 8,000 lb. per sq.in. on tensile pull tests. The strength of a soldered joint is built up to a large extent by the fillet which should be formed on the back of the seam as well as the front. To secure full penetration, it is of course necessary that the full width of the seam be heated to a point above the complete melting point of the solder. Appreciating the slowness with which the alloy conducts heat, it is obvious that, using ordinary grades of solder, either greater heat must be used on the soldering iron, or its travel must be slowed, to give sufficient time for the full width of the seam to attain the proper temperature.

Both of these methods make the operator deviate from his usual practice, and unless he is unusually skilled the work is likely to be faulty. To evercome this a special solder and a dairy solder have been developed, which not only have greater strength, but are completely liquid at lower temperatures. Ordinary soldering temperatures heat the entire width of the seam to a point where these new solders will penetrate the seam and form the necessary fillet on the reverse side.

In order to secure these results, parts to be soldered must be free from oxide and grease, otherwise the solder will not adhere. On account of the high resistance of the metal to chemical corrosion, ordinary fluxes do not etch the surface properly, so a special flux has been developed. On account of the tendency of flux acid to attack the metal, it is necessary that all surfaces be washed thoroughly with a soapy or soda solution after soldering.

Tests have shown that a soldered joint with $\frac{1}{64}$ in. of solder between the surfaces has much greater strength than one in which the surfaces are only sweated together.

Mass Production of Engineers

ANOTHER PHASE OF THE SOVIET EXPERIMENT

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Assistant Professor, College of Engineering, University of Michigan

SOVIET RUSSIA, to an average American who does not understand the peculiar Russian psychology, is a country full of mysteries. The present form of government; the social, political, and industrial activities; and especially the suppression of religious and nationalistic prejudices, tend to deepen these mysteries.

The attempt at mass production of engineers should not surprise one because everything in the Soviet republics seems to be done on a gigantic scale. Last year not less than three hundred scientific expeditions were searching in different parts of this extensive country for new natural resources.

Russian factories operate twenty-one hours a day for three hundred and sixty days in the year. Tractors are produced in Stalingrad, so it is reported, at the rate of 54,000 a year, with men and women operating steam hammers barefooted and without gloves.

In any industrial enterprise three factors are indispensible: good management, capital, and trained workers. The old factory managements have disappeared from Russia. Either they were exterminated, or their members fled the country. As a result, capital is being wasted in experimenting without proper management. Out of 150,000,000 population, I dare say there are less than 400,000 factory-trained men and women, and practically no native engineers. Management is the weakest point in the Soviet body.

Poor engineering and poor management made a useless accumulation of cement and machinery of the Volkhov Electric Works, proclaimed to be "the greatest engineering accomplishment." It was completed in 1927, and developed only one-third of the required capacity. A year later it was necessary to redesign and completely reconstruct the entire plant.

Trucks, tractors, textile goods—as a matter of fact, almost everything produced by these newly-created industries—are defective. In some cases, the percentage of defective products, according to the official soviet press, runs as high as sixty to ninety per cent.

The Supreme Council of National Economy realized these difficulties, and two years ago they issued an order to the higher technical institutions to educate and have ready by the end of the first five-year industrial plan, 184,000 engineers. This is the greatest enterprise in the history of the human race, if the following clause is added to the above order: "Seventy-five per cent of the above 184,000 engineers must be recruited from among the proletarians."

The unfortunate professors of engineering in fifty-five technical schools gasped. They could not see how it was possible to accomplish such a tremendous task. Finally, the time was extended one year, and they were told to produce the 184,000 engineers by the end of 1934.

It is interesting to know what the Soviet school system, considered by Russians and some western students to be "the best in the world," accomplished in the past ten years. Comrade Joseph Stalin, Secretary of the Communist party, reported at the annual meeting that:

1. 11,638,000 persons, probably children included, were educated in the art of reading, writing, and arithmetic.
2. 33,100 citizens attended the industrial, technical, agricultural, and transportation schools.
3. 238,700 students filled all descriptions of trade schools.
4. 190,400 persons attended universities and engineering schools.

The percentage of illiterates has been reduced so rapidly that at the present time it is only 37.4 per cent as against the previous figure of 67 per cent.

Comrade Professor Blank, member of the Supreme Committee of Engineering Education of the Soviet Union, explained to the writer their methods of educating engineers.

Every school is working in three shifts. Schools are preparing engineers and instructors at the same time. In many cases specialists and prominent engineers are commandeered to go to these schools to lecture on special subjects.

The schools notify the trade unions two years in advance to select and prepare a prescribed number of candidates from among the factory workers.

The government provides room and board, books, and free school to the selected students, and supports their families, if the candidates are married.

The courses are prepared in such a way that only the most essential subjects for each specialty are being taught. In other words, there are separate courses for engineers to be employed in textile industries, foundries, machine shops, shoe factories, blast furnaces, etc.

Prerequisites and subsidiary subjects are regulated according to the needs of the main purpose.

Committees composed of the more capable students and instructors help those who either are not prepared properly or who have difficulties in their studies. All professors are working overtime. The pertinent question is: Suffering from the lack of a sufficient number of instructors, adequate laboratory facilities, and properly prepared human material, will they succeed in producing the 184,000 engineering graduates?

It appears that this is just another gigantic dream, twenty per cent or less of which will be realized. The balance, or eighty per cent, will go back to their respective shops as gang bosses and foremen. Even, if they do not qualify as engineers, these students will be an asset to the future development of present-day inefficient Soviet enterprises.

The Second Western Metal Congress

EXPOSITION visitors, 10,000 daily; exhibitors, 167; registration, 4,000. This is the statistical record of San Francisco's second Western Metal Congress and the accompanying Western Metal and Machinery Exposition during the week of Feb. 16. Displays showed the full range of the industrial use of metals, most conspicuous exhibits dealing with alloy steels, special tool applications, precision instruments, welding in its many new phases, metal saws, and high-speed drills in action. A special section was devoted to gas furnaces. Exhibitors expressed themselves as pleased with the attendance and interest, a feeling shared by the co-operating technical societies and expressed to representatives of *American Machinist* covering the Congress.

J. M. Watson, President of the A.S.S.T. and Chief Metallurgist of the Hupp Motor Car Company, discussing "Automotive Steels" in his S.A.E. paper on Feb. 17, described types of steel used in automotive construction, explaining their properties and working. His discussion was a part-by-part presentation, showing why certain steels are used for certain parts and indicating future possibilities. He suggested keeping the number of steels as low as possible to permit fewer heat-treating units, more efficient inspection, longer equipment life through lessened temperature changes, and greater purchasing economy. Diversity of opinion among metallurgists and manufacturers leads to use of a large number of steels, a total of 69 having been standardized by the Iron and Steel Institute, including carbon and many different alloy combinations. The author disagrees with the majority of metallurgists on the subject of physical tests, his stand being that the standard tensile test rarely gives information about actual use in the car. The paper concludes by stressing the necessity for close co-operation between metallurgist and designing engineer.

At the same session, B. F. Shepherd, Chief Metallurgist, Ingersoll-Rand Company, explained the meaning of the term "personality" as applied to steels. A better word is "timbre," defined in Carpenter Technical Bulletin C as the inherent "property of tool steel independent of analysis which influences the degree of hardness penetration and width of allowable quenching range." The writer showed that timbre exists not only in tool steels, but also in such steels as certain nickel-chromium and chrome-vanadium alloys. His company has devised methods for testing general adaptability of various steels for specific uses, enabling the best steel to be selected from several of the same composition from different sources. Development of tests to determine timbre in alloy steels is to be desired, with the aim of making timbre a main criterion of selection rather than chemical composition. This offers promise of improved product.

Paul Jeffers, Structural Engineer of Los Angeles, discussed the "Metallurgy of Welding," showing by lantern slides the constitution of welded joints and the changes in metal near the joint, the necessity of making welds under conditions that will prevent oxidation, and of having some sort of normalizing process to follow. George Bragg, at the same session of the A.S.S.T., described the design of a hydraulic jack to work at a pressure of 3,000 lb. per sq.in. setting and extracting the bolts that secure waterwheel buckets to central disks. Alloy steels incorporated in the design reduced dimensions and weights in solving the problem.

J. Fenstermacher, Columbia Division, United States Steel Corporation, explained commercial operations in controlling physical properties of unusually large carbon and alloy steel castings. He showed that control of chemical composition has given his company remarkable results in consistency of product. His paper included

a table in which physical properties and chemical composition of a number of metals were given, bearing out his statement of close control in metal composition.

D. H. Young, Western Manager, American Manganese Steel Company, explained "The Useful Properties of Manganese Steels" in another A.I.M.E. paper, indicating the necessity of exact melting, casting, and heat-treatment for success. He also described remarkable changes in physical properties resulting from cold-working and stated that no critical points were obtained in either heating or cooling manganese steel.

It is difficult, if not impossible, to operate standard types of gas furnaces at nitriding temperatures, according to President James H. Knapp of the James H. Knapp Company, in his Pacific Coast Gas Association paper, "Gas Furnace for Nitriding." Semi-muffle furnaces are quite suitable for operation at 1,200 deg. F. and up, but nitriding requires a long heat at a uniform temperature around 960 deg. F. One successful nitriding furnace avoids hot spots near burners by discharging a properly proportioned combustible mixture of gas and air through an inner pipe, the mixture burning in a cone off the end of a prolonged outer cold air pipe. The outer pipe overcomes a focus of high temperature by blowing cold air in an annular sheath surrounding the flame. The burning gases, mixing with the cold sheath air, are diluted to lower the intensity of their heat.

The first part of G. E. Stoltz' A.I.E.E. paper, "Electricity in the Steel Mill," is an economic discussion of our industrial situation since the World War and the part that electricity is playing in aiding manufacturers to lower production costs to keep in line with the steady decline in commodity selling prices. The second part deals specifically with steel mill problems and how the introduction of electricity has enabled continuous processes to supplant older methods of making such products as strip, sheets, and plates. Illustrations were included to show the old type of mills and the improvements rendered possible by the use of electric drives.

"Recent Developments in Corrosion Prevention of Ferrous Metals," by V. V. Kendall and F. N. Speller, Research Department, National Tube Company, is a review of outstanding developments in corrosion work during the past year or two. It covers in general the more important activities, particularly in the oil industry. Improved methods of laboratory testing and recent studies of films on metals has added greatly to knowledge of the subject. The electrolytic theory still explains satisfactorily most of the problems in the corrosion of metals, outstanding factors being: potentials induced by variations in concentration of oxygen or contact between dissimilar materials, anodic and cathodic polarization; and the formation or lack of formation of protective films on the surface of the metal. Direct chemical attack occurs at high temperatures and in some other instances such as the presence of certain sulphur compounds in crude oil products in the absence of water. Organized co-operative work against corrosion has accomplished a number of things during the past five years, among them the increasing of steel life under outdoor corrosion two to five times by adding 0.25 per cent copper, at a cost increase of 5 per cent, and developing new paints and lacquers much more resistant. About $100,000,000 is spent annually on outdoor coating materials. These must stand abrasion in addition to corrosion.

Someone has said, "There are as many brands of stainless steels as there are five-cent cigars," a statement which should be amended by inserting a "good" before the "five-cent-cigar." C. C. Snyder, of Republic's Research Department, predicts standardization of stainless steel compositions in his American Chemical Society paper, "Chromium and Chromium-Nickel Steels." He expects them to be numbered as are S.A.E. steels.

A "hypodermic injection" of nickel in molten gray iron prevents the metal from developing a weak structure, according to Frank B. Coyle, Research Metallurgist of the International Nickel Company, in his A.I.M.E. paper, "High-Test Cast Iron." The injection of nickel, or nickel and chromium, and the lowering of the graphitic content as far as possible breaks up the flakes of graphite which tend to weaken the metal's structure, allowing it to attain a strength nearly double that of ordinary gray iron.

EXECUTIVE FORUM

Buy Design?

THE TELEPHONE on Fred Longman's desk buzzed insistently. For the chief engineer of the King Machinery Company, the telephone was a mixed blessing. He couldn't do without it, yet it was a source of constant interruption. Grudgingly, he turned away from the examination of a new design layout.

"This is Jim Sargent," came the voice of King's sales manager over the wire. "You remember those two machines we shipped to the North Bend Railroad about two weeks ago? I want to get drawings for them. When you get a chance, will you please dig them out?"

"Assembly drawings?" Longman asked.

"The whole works," said Sargent. "Assemblies and details."

"It's quite a job to get out all the tracings and get them blueprinted," said Longman, "but I suppose it can be done. What are they for?"

"For the North Bend people," said Sargent. "They've passed a new rule up there that drawings of all equipment must be kept on file—for repairs I suppose."

"They don't need detail prints," said Longman. "We sent them the usual foundation plan and clearance diagrams in advance of shipment. We might concede them a couple of assembly views to keep them quiet. When they bought our machines, they didn't buy our designs as well. Besides, we need all the repair business we can get just now."

"North Bend has always given us the repair work for our machines," said Sargent, "and I think they'll continue to do so. This request for drawings is nothing to get excited about. Some one had a brainstorm and established a new rule. You know how railroads are—probably next year it will be forgotten. It won't be politic for us to antagonize them by refusal."

"I don't like it," said Longman. "How do we know what use these drawings will be put to? They may make repair parts themselves, or pass around prints to job shops for quotations. There's a good chance that our competitors may get their hands on them. I understand that with your sales complex the customer's word is law. You'd give them the plant to avoid an argument. But these people are rubbing it in—they're asking for something they didn't pay for and aren't entitled to."

"I'm not so sure about that," said Sargent. "We continually have to give customers more information with our machines. Customers claim the right to all available data on the equipment they buy, and perhaps they're right. We can't prevent them from making their own repair parts if they wish—they can even duplicate our drawings from the machines if they want to go to the time and expense. After all, what harm would be done if a competitor did get a few of our prints? The machines are well known, and every manufacturer in the field is familiar with the general design. No one would attempt to duplicate them dimension for dimension even if he could get around our patents."

"I don't know what they're up to," said Longman, "but I do know they have no legitimate need for detailed prints. I'm not going to inaugurate a policy of passing out our designs to anyone who asks for them. You'll have to obtain official sanction first."

"That'll mean more talk and more delay," said Gilmore. "If you fellows would get away from your drawing boards and try hustling for orders a while, you'd get a different slant. Maybe you'd be willing to co-operate a little more."

Topic suggested by H. S. Deeley, Planning Engineer, Johns Manville Company, Asbestos, P.Q., Canada.

■

What Do You Think About This Problem?

It's like pulling teeth to get detailed prints from some companies. Others, notably electric equipment manufacturers, seem ready to supply complete data concerning their product. Which practice is wiser? Has a customer a right to demand design details of the machines he buys? In the face of such a deman, should a manufacturer yield to appease the customer? What limit is there to the ethical use of this information?

. . . Discussion
of Executive Problems

■

Promising Performance

When a prospective buyer of machine tools haggles for guaranteed performance, he is already sold on the machine. He is obviously trying to get something for nothing. The salesman is paid for his ability to break down such arguments and close the sale. He has only met with one of the stumbling blocks met by salesmen every day, and it's just as much his job to remove such obstacles as it is the job of the man in the shop to overcome difficulties in manufacturing. Anybody can sell machines with performance guarantees, but machines cannot be sold profitably under these conditions. The prospective buyer is given a demonstration and knows what the machine will do under normal conditions. Every machine carries a guarantee against defective material and workmanship. The manufacturer who goes any further than that is courting trouble. He has no jurisdiction over the machine after it is delivered

—W. J. Owens, *Foreman, Newport Rolling Mill Company.*

Dole or Control?

Employers used to talk of markets for their goods as if they were far-off lands, whereas we realize today that the market is in our immediate vicinity, and among the workers themselves. If we make machine tools, we cannot sell them unless we in turn buy food, clothing, light, power, radios, sewing machines, fans, and automobiles. For if the manufacturers of these articles cannot sell their wares, they cannot buy machine tools.

With this in mind, common action seems necessary for the welfare of all, and some kind of employment assurance is necessary either through profit sharing or assured jobs. The huge fortunes piled up by some industrialists, indicate that these millions are excess profits, and should be returned to the workers at least in the form of a job for a half day, each day. Then this money would be returned to circulation to purchase manufactured goods.

This adjustment would best be made by manufacturers' associations before government action is called for by demagogues with subsequent inefficient administration of doles or other forms of charity. Valleys of depression could be filled considerably if an intelligent and earnest investigation were made of the causes of hard times; this should not be entrusted to politicians who see only party shadows obscuring the sun of prosperity.

—John S. Isdale, *Plant Engineer, International Silver Company.*

I do not believe periods of depression are entirely avoidable, but much can still be done to decrease their violence. Distributing the work load more evenly throughout the year, diversifying the line of products, keeping up-to-date on technical developments, modernizing equipment as new machines appear, planning major maintenance jobs in advance, and similar moves associated with intelligent management, will all help in mitigating the difficulty.

Industry has a moral obligation with respect to the worker thrown out of employment, but this should not be a binding financial obligation, for the obvious reason that industry cannot stand such a burden. Throwing the burden on the government does not solve the problem, for the government merely throws it back on industry. The situation can best be met by a series of successive steps. First, all reasonable additional manufacturing and maintenance activity which can be logically authorized, should be thrown into the breech. Then, personnel which is below a reasonable standard (every organization accumulates dead wood in times of accelerated activity) should be let out. If possible, opportunities to work in some other department at a lower classification should be offered, but only after the discharge has been definitely made, and not as a matter of direct transfer. As a last resort, if further reductions in payroll are necessary, the men should be given an opportunity to vote on further discharges as compared with a reduction in the number of working days or hours for all.

—Eli Smith, *Engineer, Russell & Company.*

Anticipation Without Realization

Employees respond to the stimulus of extra compensation. But the compensation, when in the form of a bonus, should be for extra effort and better work, not for sentimental purposes. A bonus, founded on sentiment, is a burden to the company and does not arouse more interest on the part of the men. However, in the example given, the stoppage of the bonus is creating dissatisfaction. Already there were definite indications that loyalty was losing ground.

A spirit of loyalty can be instilled in men when they know that the firm will show appreciation for good work. However, I consider those workers of the Mid-City Machine Works presumptious in regarding the payment of the special bonus as due them when the new management announced that the bonus was discontinued. The policy change of the discontinuance of the special bonus was a step in the right direction of cutting out unbusiness-like relics of private management. However, a sane bonus system applicable to the entire group of workers, instead of a special group of a few men, is entirely practicable and a factor in creating good-will.

—M. Buswell.

I don't blame Jim Collier, and the other eleven men one single bit for being discontented. They are entitled to the hundred dollars just as much as they are their weekly pay check. If a man has given a concern ten years of continuous service, is the minute sum of ten dollars a year such an outrageous bonus? Just think of the co-operation these men gave the company.

Employees today are not content with an hourly rate or a flat day rate. In a very short time, they lay down

on the job. The bonus or incentive system is the best remedy for this, as can be seen by picking out any number of concerns at random; most of them have some system of bonus. Let us suppose that the concern in question instead of having weekly bonus, promised the workmen ten dollars a year for continuous service. At the end of the year the men go to collect this premium only to find that it has been discontinued. How would you and I feel? As for me I would have no doubt but that I had earned the premium, and I would feel that the company owed me that much. I believe that in the end the company will lose more by refusing the bonus than by paying it. —MAURICE H. BAITLER,
Perkins Machine & Gear Company.

The More the Brainier?

It has been my experience that the old adage, "too many cooks spoil the broth," still holds true in the shop of today. This is invariably true when the co-operation, supposedly represented by many minds, is contributed in the form of a mass assemblage. The primary obstacles lay in the fact that many plausible suggestions, considered each by themselves as being perfectly feasible, simply will not dovetail together to form a co-ordinated whole.

Where co-operation is desirable, I believe it is more productive of results to seek it quietly of the individual, asking specific questions and discussing the conclusions in detail. In all such co-operative endeavors, it must be strictly understood that responsibility is not delegated in any manner—the man whose job the undertaking is, still holds full power and responsibility.

—BERNARD F. MCCORMACK.

While it may be true that discussion with others on a given problem may bring to light some new ideas, in the main, giving one man the sole responsibility is preferable. If we place a man in charge of a given department or activity, we do so because he is the best man we have for that particular job and his abilities, training, and experience are such as to fit him for the post.

Try to fit your men in the jobs for which they are best adapted and then let each have sole responsibility in his own department. Interlocking responsibility often leaves a chance to "pass the buck," but if a man has sole responsibility, he acts accordingly and faces his problems squarely. —H. GREENHALF,
Ford Motor Company of Canada.
Walkerville, Ontario.

Ex Rights

When a man leaves the employ of one company for a better job, he is often regarded with a suspicious eye as long as he is on the premises. Sometimes it is felt that he is putting something over on the company, possibly revealing some of its supposed secrets. Since the company has paid for the services rendered by the departing man, it is entitled to retain the results of his efforts. Yet it is possible for the management to place restrictions on what he takes with him which may seem very childish. The company may prohibit the retaining of copies of forms which a man may have developed, but it cannot control the use of his knowledge and experience. Every factory must have a system and forms shaped to its own requirements. No matter how similar the products are, conditions in different establishments are not and never will be the same. So it is quite probable that the ex-production manager of the Eastside Machine Company will work out a better set of forms to use in his new job than the old set would be if taken with him. —L. O. BROWN.

Most designers sign an agreement to assign all patents to their employer on machinery designed during their period of employment in or out of working hours. Yet, although their employer has the patents on their design, the vast majority of them will take with them, when they leave, photographs or blueprints.

When a man leaves a firm, you cannot take away what he has learned. Nor can you stop him from using it for his next employer. He should be entitled to take with him tangible results of his work. Everyone does so.

Did Mr. Moore stop to wonder how many of these same forms might have been the product of Bloodgood's previous employment, or might have taken shape at his home, or on the train, when he might have kept them for use of a more generously minded employer? When Mr. Moore goes back to his office, and thinks over this matter I think he will find that Bloodgood is justified in his stand, and that he himself has been childishly swayed by a slight irritation against his competitor for taking away one of his men. —W. A. WALTER.

On With the New?

Nobody can question the wisdom of promoting an understudy in a well organized company because there are many advantages to be gained in so doing. Every well organized concern should see that a few promising young men are employed in the ranks who have the qualifications and personality sometime to assume the many important key positions. These young men must be carefully selected and must be given the opportunity of working in every department to gain practical knowledge; in addition they must be trained by post-graduate study, with reference to theoretical phases of his work.

If the management neglects to put in action this fundamental principle of previously recruiting a sufficient number of understudies, it will be put in the embarrassing position of having to hazard the business by the introduction of a new man. Inevitable entanglements, cross currents, petty jealousies, friction between the new and old employees, and lack of a thorough knowledge of the business are likely to accompany this move.

—H. EZRA EBERHARDT,
Gould & Eberhardt.

It would be better to bring in the new man. If he is going to see well in front of him after learning the ropes, it is better than sliding along in the same old groove. Suppose he is a failure; his services could be dispensed with, without causing any friction in the shops. If the toolroom foreman is promoted without success, it is going to cause some ill feeling, when the time comes when he must relinquish his position. By not introducing the new man, we are not speculating, and if we never speculate, we never accumulate. —R. H. JACKSON,
Barrow, England.

Links and Link Tools

W. H. MALLIET

Supervisor of Design and Development,
The Royal Typewriter Company

IN certain office appliances, such as listing, adding, and multiplying machines, typewriters, and the like, wires from 0.040 to 0.085 in. in diameter are utilized as linking agents to give movement to levers or printing bars. As such, they are generally called links, and when used to move shifting levers backward and forward, are sometimes connected by small turnbuckle nuts to allow for adjustment. A typical example of the use of wire for links in such cases is shown in Fig. 1.

It is generally necessary to cut off and shape these wire links with uniformity and within close limits, due to the clearance required when used in compact machines. Not only must the pieces be held to close limit for lengths, but the centers or ends have to be offset, bent, or sheared to outline. If they require a temper for strength or stiffness it is difficult to bend them to a constant set angle. Sometimes the ends, after being looped or bent, require a clearance on the side to eliminate interference from other parts. This clearance is usually secured by shearing the sides of the wire after it is bent to shape. The present article is, however, confined to cutting off and bending.

As the production cost of these small parts is essential in these days of keen business competition, the method and tools designed to produce these links demands careful consideration.

For a production of wire links totaling two or three million a year, it is practical and cheap to make the parts on automatic wire cutting-off and forming machines. Such machines will produce the parts at the rate of 8,000 to 10,000 pieces per hour. There are companies that make a specialty of manufacturing this style of machinery.

But for small lots, these machines are expensive and require some little time to set up and adjust for different shapes and lengths. Where the requirements for various shapes and sizes of wire parts of small diameter

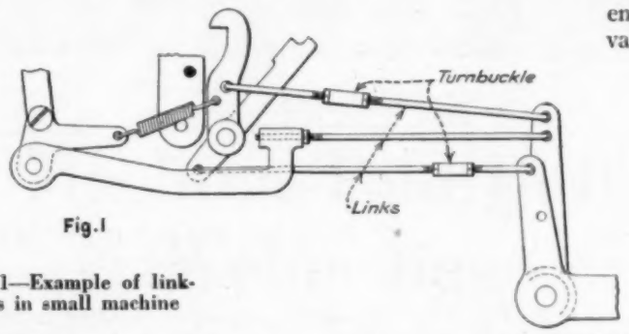


Fig. 1

Fig. 1—Example of linkages in small machine

The first of two articles. The second will appear next week.

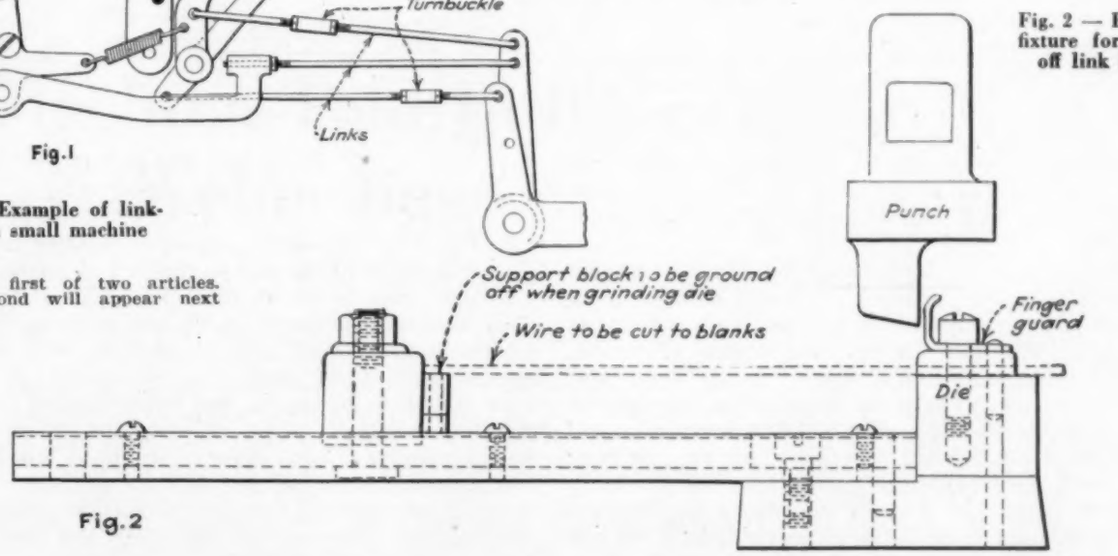
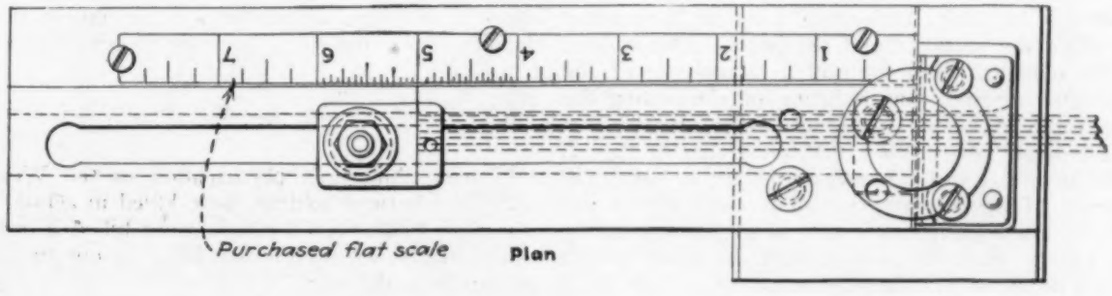


Fig. 2

Fig. 2 — Punching fixture for cutting off link blanks



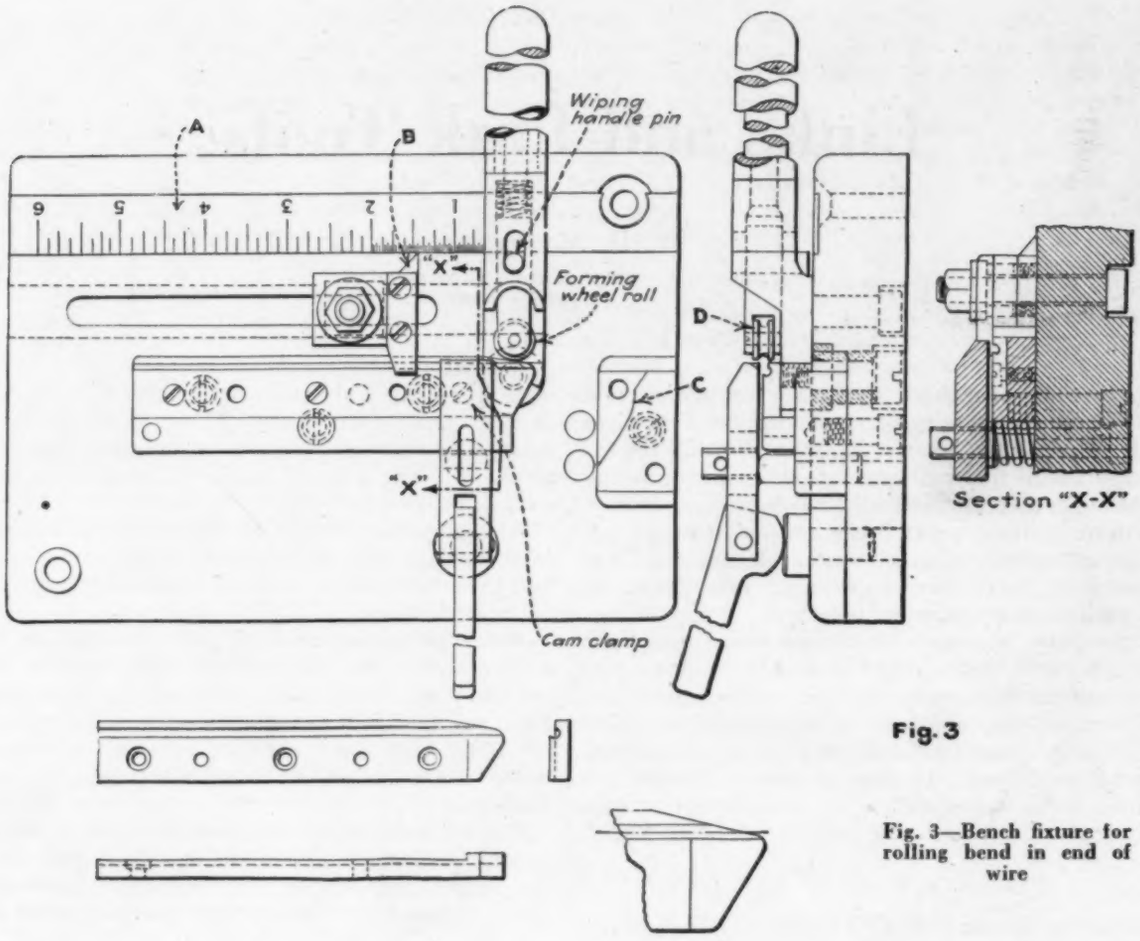


Fig. 3

Fig. 3—Bench fixture for rolling bend in end of wire

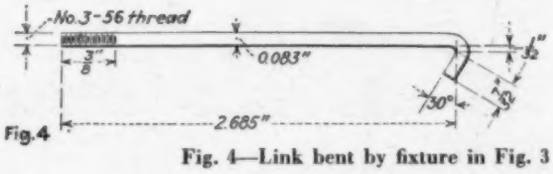


Fig. 4

Fig. 4—Link bent by fixture in Fig. 3

are only from 2,000 to 4,000 each per week, punches and dies, or bench fixtures are cheaper and more suitable. If punches and dies are used they should be constructed in die-sets with guide pins to facilitate quick setting up in the punch press and should be used with safety guards. This is very essential, as operators are apt to take their eyes from the tool while talking to a neighboring operator.

A good tool and die designer will be able to determine whether a complete machine, a bench fixture, or a punch-and-die set should be planned and utilized to manufacture the parts needed. The design, of course, depends on the quantity to be made.

If the parts are to be made by punch-and-die sets or by hand-operated bench tools it will first be necessary to cut the wires off to blank lengths. This may be done either by a wire cutting-off screw machine or by a cutting-off punch and die. If the blanks are obtained from a punch and die it will be necessary to have the raw material in short lengths, such as 35, 36, or 38 in., to facilitate easy handling. Less space will then be required for handling the stock around the press. The lengths should be obtained from the mill in a multiple of the blank lengths desired, thus reducing or eliminating the waste of scrap ends after cutting to unit lengths.

With a punch and die like that illustrated in Fig. 2, from ten to twelve pieces can easily be cut to lengths at each stroke of the punch at a cost of about $0.055 per thousand. The scale makes it easy to set the stop to the proper length. Both die and support are wide enough to carry a dozen wires side by side.

In Fig. 3 is illustrated a wiping or bending fixture to obtain the shape of the end on the part shown in Fig. 4. This part must be cut to blank length in a screw machine to obtain the thread on the end opposite the hook. As this particular tool bends the ends of eleven different lengths of links, the scale *A* is necessary to locate the work stop *B* in setting the tool when bending each part of different length. After changing the tool setting to bend a quantity of each different length of link an operator can bend from 600 to 800 links per hour. A cam clamp is necessary to keep the wire from pulling when swinging the wiping or bending handle that contains the forming wheel that rolls the link to shape. The cam block *C*, through the medium of the pin in the wiping handle, forces the roll *D* to form the end of the wire.

■

During America's participation in the World War, 37,568 American soldiers were killed in action. During the year 1928, 96,500 people were killed in accidents—more than twice the number killed in our two-year participation in the war.

Fig. 1—Checking center distances on a large fabricated jig

A Machine Tool Builder Welds Jigs

Methods employed and results obtained in jig and fixture building at the Brown & Sharpe Manufacturing Company

JIGS and fixtures have been used to provide economies in the manufacture of duplicate parts for many years, but it is only recently that any efforts have been made to increase the economy of building the jig or fixture itself. On the next page are shown two jigs for practically the same part, that on the left of cast iron, that on the right of welded steel. The first requires some six to eight weeks to complete, including design, patterns, casting, and finishing; the second requires about a week. In modern tool building, time is at a premium.

To appreciate advantages derived from employing arc-welding, it is perhaps the better to follow through the various steps in the process of fabricating a jig or fixture. First, the tool designer is furnished a complete list of stock sizes of steel, such as cold-rolled bars, boiler plate, channel irons, T and U sections, from which selections of the desired stock can be made. If large plates are needed for side walls, these are cut from flat stock with an oxy-acetylene torch.

To effect the greatest economy, it is well to design tools for structural construction rather than for the solid-wall method used in cast-iron jig construction. Such construction is well illustrated in Fig. 4, which shows a large jig made up of angle and T irons. A fabricated steel jig, when correctly designed, should have approximately the same strength as a cast-iron jig, and yet should be considerably lighter. However, steel being heavier than cast-iron, more weight can be put into the cubic inch of steel fixtures than in those of cast iron, a decided benefit under present-day milling requirements. It might be well to note that due allowance should be made for the fillets required for arc welding. Tolerances allowable in the tool influence the design. Quick-acting clamps and stock parts should be used wherever practical, just as in making cast-iron tools.

In order to facilitate the welding of these tools and the proper positioning of the blocks which make them up, a welding drawing is furnished. This is a tracing made from a tool drawing and can be put into the welding department before the completed detail drawing is ready. The drawing is forwarded to the department where the required stock is cut and made ready for the welding.

On jig walls and bosses where holes are necessary, they can be cut out by the oxy-acetylene torch before assembly. This method eliminates the expensive core boxes formerly required. After the plates are in the proper condition for welding, they are assembled, squared up, held in position with C clamps, and tack welded before being turned over to the welder. Tack welding should be done by an experienced welder capable of reading a blueprint or a tracing; the tool can be finish-welded by any good welder. Welded joints should be tested occasionally for required strength.

It is necessary to normalize the welded tool before machining to relieve strains set up by welding. This is accomplished by heating the jig or fixture to from 1300

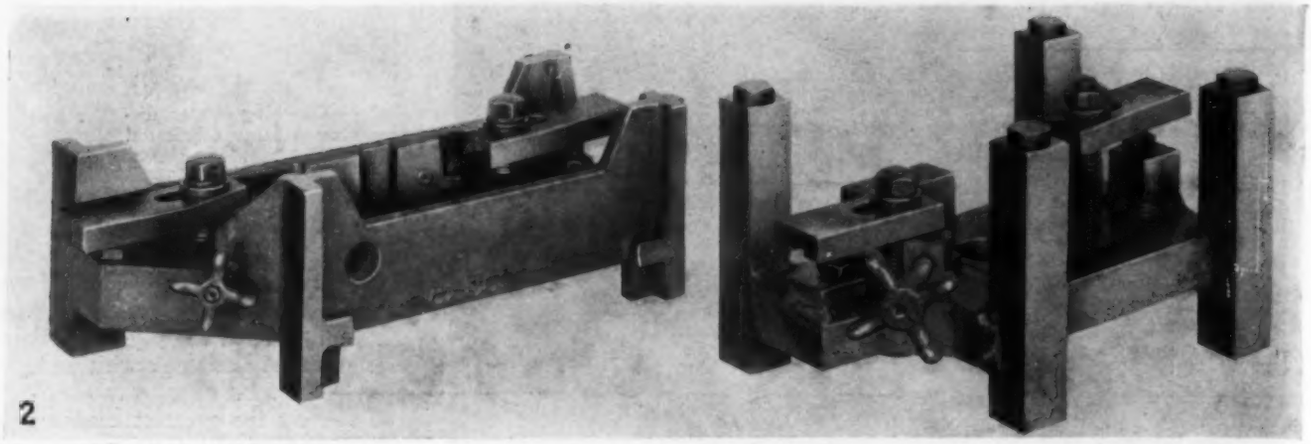


Fig. 2—Direct comparison of cast-iron (at left) and welded steel jigs for similar parts

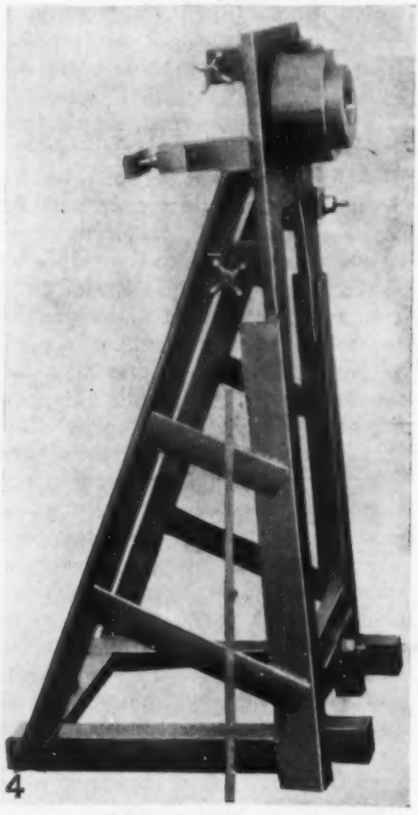
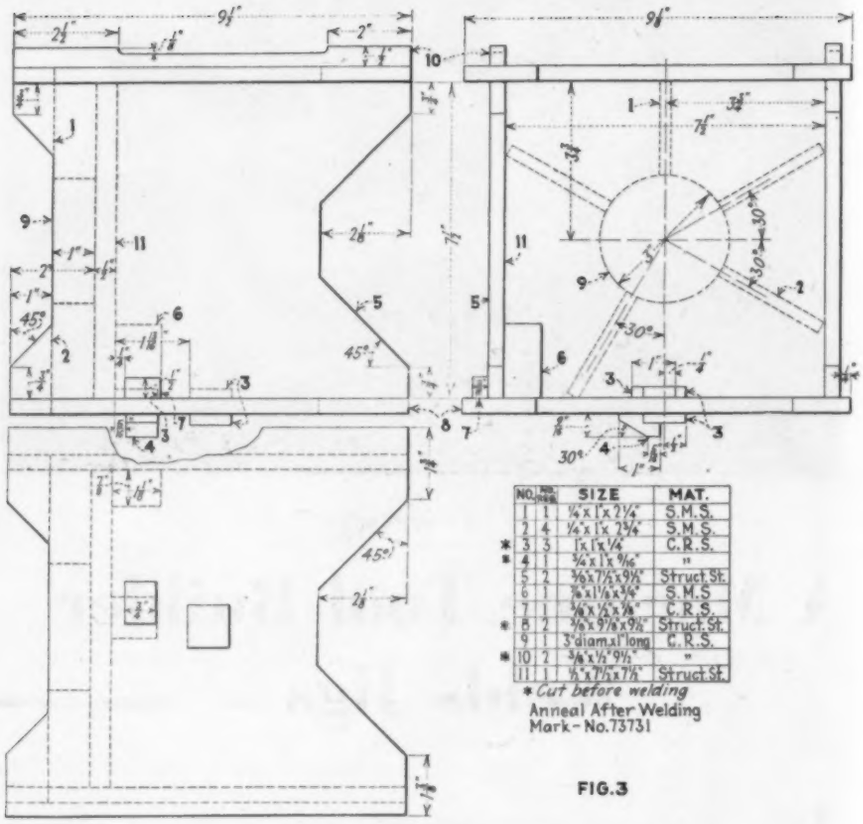


Fig. 4 — Angle and T-irons are used on larger jigs. A large piece of round stock, welded in place, provides a boss for the drill bushing



NO.	SIZE	MAT.
1	¼ x 1 x 2¼	S.M.S.
2	¼ x 1 x 2¾	S.M.S.
3	1 x 1 x ¼	C.R.S.
4	⅜ x 1 x 9⅛	"
5	⅜ x 7⅛ x 9⅛	Struct. St.
6	⅛ x 1⅛ x 3½	S.M.S.
7	⅛ x ½ x ⅞	C.R.S.
8	⅜ x 9⅞ x 9⅞	Struct. St.
9	3" diam. x 1" long	C.R.S.
10	⅜ x ½ x 9½	"
11	½ x 7⅞ x 7⅞	Struct. St.

* Cut before welding

Anneal After Welding

Mark - No. 73731

FIG. 3

Fig. 3—Special drawing carrying welding instructions and listing required stock. Such a drawing is also used by the assembler to facilitate positioning of parts

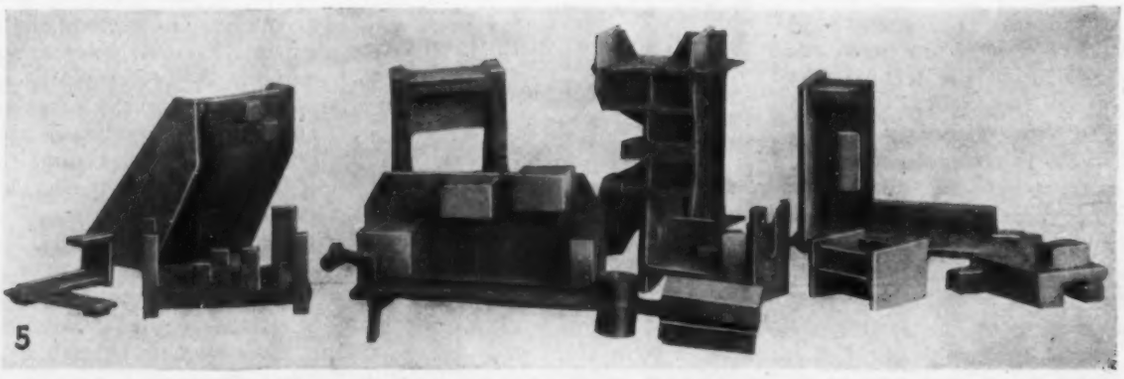


Fig. 5—A group of jigs and fixtures finish welded and ready for machining

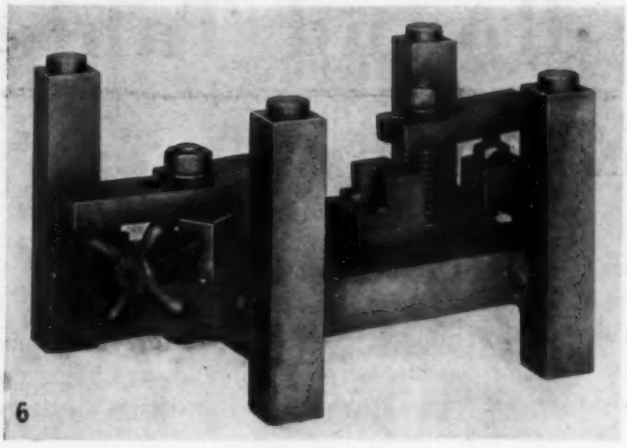
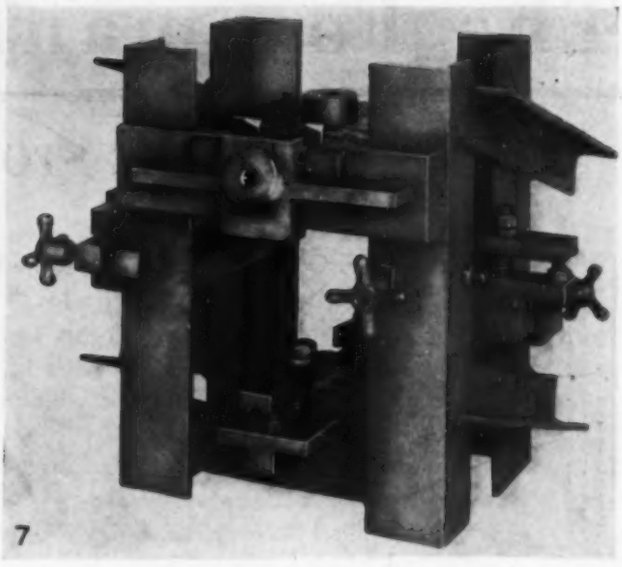
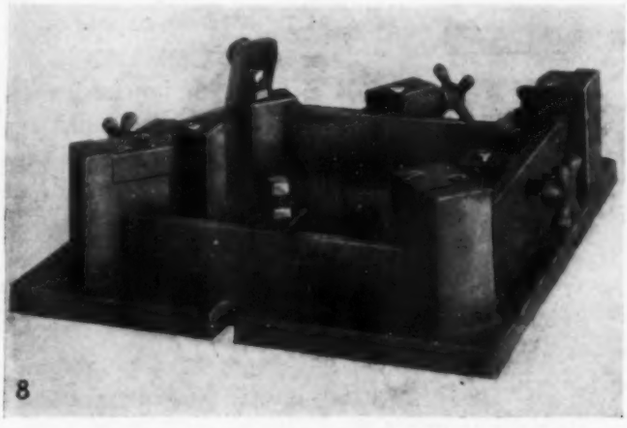
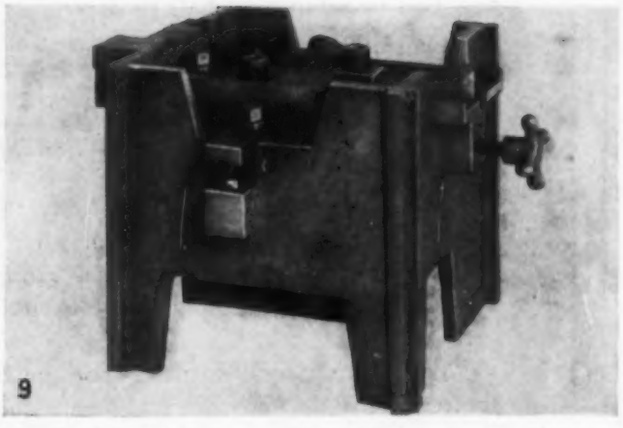


Fig. 6—Hardened steel buttons are set in the feet of some jigs to maintain accuracy and lessen wear







Figs. 7, 8, 9—Miscellaneous finished jigs and fixtures

to 1350 deg. and allowing it to cool gradually. Tools may also be sand blasted to remove the scale, but the factor of appearance is less important when the tools are used within the plant than when made for sale. In some cases where excessive wear may take place on jig feet, it is necessary to put in hardened steel buttons to keep the surfaces from becoming burred.

Manufacture of the jig in the toolroom is carried along practically the same as in making cast-iron tools, with the possible exception that lubrication on heavy cuts is necessary. Manufacturing time in some cases costs up to 5 per cent more with steel than cast iron due to the machining, but this is offset by the elimination of the pattern costs, and cheaper materials. Savings up to 25 per cent in the cost of jigs and fixtures may be realized by employing arc-welding.

■

The Chinese Engineering Shop—*Discussion*

WILLIAM BRYCE, *England*

ON READING the brief but interesting article by John R. Godfrey, page 987, Vol. 72, four things impressed me: The variety of work, the crudity of methods, the character of the workers, and the tact necessary on the part of the managers.

It appears anything comes within their scope, from household jobs to machine manufacture and foundry work. There is little use for repetitive methods. It is more a matter of turning the hand to anything, small, great, rough, or particular. The smith prefers a hand-operated air pump to our mechanical blowers. Doubtless the Chinese view labor-saving methods much as our forefathers did the locomotive, and are in a better position to dictate about their use. They appear to make good mechanics, handling the old-fashioned English machinery with a fair amount of skill. The tact necessary on the part of supervisors must be of a high order, compared with that of more civilized countries. It is a lesson to young men who contemplate going out there. The John Bull type would not hold his position long. Evidently there has to be much closing of the eye and holding of the tongue. Fancy being compelled to tolerate the foreman accepting monthly bribes from the workers.

While we marvel at these oddities, let us remember that small beginnings have great endings. We may yet see good shop practice in China.

The Foreman's Round Table

THE STORK'S ASSISTANT

"COME ON, Ed, it's time for the lowing herd to wind o'er the lea," said Al, as he stopped before his friend's desk. "Say, did you ever read Gray's Elegy? You ought to, it would just suit your disposition, the way it's been lately."

"Is that so? I used to recite that thing when I was a kid, and I felt sorry for the plowman, but I know better now. The plowman had a snap alongside us foremen, he only had two dumb animals to drive."

"Come on, don't act like you are afraid to go home. If you don't buck up I am going to have your wife call in the doctor; you need to have your apprehension removed, I think."

"Don't mention doctors. You have them when you're born, you have them when you die, and as often in between as they can manage. Now they are coming to the shop after us."

"Well, I had one working for me as a toolmaker, if that is what you mean, and he made a bang up surgeon too. He didn't use a power hack saw and a drill press in his practice, but he did drill and tap and fasten broken bones with dowels and screws. I think they would all be better for a little shop practice, Ed."

"Maybe, but that's not what I mean. I mean that 'they' have no business making a medical examination compulsory."

"Who said anything about that? And what of it if they do? Any of your organs missing?"

"No, but I figure there will be soon. Down at the 'big shop' they are going to make examinations compulsory not only for new men, but for all the old hands, too. Some executive must have a doctor son-in-law, I guess."

"Well, again I say, what of it? Isn't it a good idea to know your own state of health?"

"Yes, but I don't want it forced on me. And tell me, why is it they always bring up these things when work is slack and a man is afraid to kick about them?"

"Wouldn't you say that the best time to start such a thing was when the minimum number of people would be disturbed?"

"But it's nobody's business how a man's health is as long as he attends to his work, is it?"

"Maybe not, Ed, but with job insurance, increased compensation awards, and old age and disability pensions looming up, it's a wise concern that begins to raise its standard of personal fitness. Public opinion would condemn discharging unfit people after the law is passed."

"Well, I've heard you say the compensation law was a good one."

"It is, but after it was passed companies paid compensation for every case of hernia contracted within the previous ten years. If they had insisted on a medical examination they would have saved a lot of money."

"Granting that, why can't a man bring a certificate from his family doctor?"

"For two reasons: First, you and people like you would claim that it was unjust for the company to make you pay for it. Second, one of the arguments in favor of the compensation law was the fact that it would eliminate shyster lawyers. It did. but it substituted quack doctors, who are just as bad. I don't believe in paternalism in business, but I would like to see a company doctor made responsible for the health of its employees."

"So would I, if it would cause the rest to go into some other line of business."

Should compulsory medical examination be extended?
If so, should the certificate of any physican be accepted?
How frequently should the examinations take place?
Should the time vary with the nature of the occupation?

Idea suggested by W. E. Warner, Herts, England.

▸ ▸ ▸ Discussion of Former Topics

No Exceptions

Some firms complain about turnover, and generally they are the ones that require a man to put up a big howl and kick like a mule for a five-cent-an-hour raise. Such things make a man disgusted with conditions, hence the labor turnover.

There are other firms that will consider a man's work and worth, with an eye to future promotions or to the cost of breaking in other men, and will give a raise without the asking.

These firms generally are officered with men broad minded enough to know that a rule is not infallible but must be broken at times for the welfare of the firm. In a case similar to the one quoted, they will consider conditions and grant a raise even above any that might have been contemplated.

—C. G. WILLIAMS, *Chief Engineer, Green Bay Barker Machine & Tool Works.*

Age and Its Compensations

It is mighty fine, and even wise, to give preference to the older man if qualifications are the same. It makes for loyalty, and the reliable old fellow who has refused to get into a rut usually has valuable knowledge that can be drawn on, sometimes not apparent on the job he happens to be doing.

Seniority rights, in the case of the man of fifty or over, work definitely against him. In the first place there has always been suspicion that the old fellow does not keep up with the younger one. It is a deplorable fact also that a lot of firms would like to get rid of the older men gracefully. Just think how much sooner the older fellow would lose his job if he expected more pay just because of being older on the job. —J. C. P. BODE.

Sauce for the Goose

The organization mentioned is most certainly a great improvement over the present methods which the Old Man uprooted. This G. M. believed in the sound management principle of responsibility with authority, knew how to apply it, and he will get results. Each of his present minor executives must stand or fall on his own abilities and efforts.

The engineering department will not dare to let any carelessly made or unchecked drawings get out into the shop. This item alone will save thousands of dollars each year. Inspection will be as strict as heretofore, but will have manufacturing guidance in the scrapping of usable parts. Making the purchasing department the raw stores keeper in fact as well as in name, will save untold expense in overtime caused by late ordering or deliveries of raw materials, of which the management is hardly ever aware. In at least ninety per cent of the companies with which I am acquainted, purchasing is their greatest obstacle to economical manufacturing. Evidently the production manager with his three or four men had only a follow-up system and did not function as a production department. The fact that his first duty would be to do the planning with the shop organization and to have finished parts ready when wanted means that the G. M. is making the production manager take a long step in the right direction.

While efficiency is fine, economical operation is better, and to operate economically, responsibility should be functionalized. Although it should be seldom necessary to use one's authority, functionalized responsibility gives enough authority to secure the results management demands from each individual.

As the same principles apply, there is practically no difference between functionalizing departments and the plant as a whole. It is the old story of giving authority in proportion to responsibility. This is a far more satisfactory way of running a plant than having certain ones "assume any needed authority whenever and wherever necessary to get desired results for his department." A clean cut dividing line lets each department and man know just what is expected of him and through whom he will secure these results.

—E. E. GAGNON, *Mechanical Superintendent, Raybestos-Manhattan, Inc.*

Mechanized

The clearest example of the effect of labor-saving machinery is found in England in the period from 1750 to 1850. At the beginning of this period, England had a large textile industry in which the work was done almost entirely by hand. Between 1790 and 1820 most of the hand spinning was replaced by power factories. Between 1820 and 1835 a similar change took place in weaving. As these industries employed such a large number of men in proportion to the population, this was probably the most drastic displacement of workers by machines in the history of the world. The new machines produced riots in which the displaced workers destroyed the machines, and public sentiment was often violent in claiming that the machines were doing harm, much more so than today. But history shows that the opponents of the machines were wrong.

In the beginning of this period the condition of the workers was far worse than seems possible today. Adam Smith, in 1776, wrote of the great improvement in the condition of the workers at that date, but he also mentioned that among some classes few children reached the age of 14. He also said that it was not unusual for a mother to have twenty children, of whom two might grow up. The census figures support these statements. In spite of the large birth rate, the population of England was almost stationary until 1776, when it began to increase more rapidly. The greatest rate of increase

did not come till the ten year period from 1811 to 1821, after which the rate of increase became slower again.

The explanation is simple. While the machines displaced workers, the increased efficiency produced new jobs faster than it destroyed the old ones. The gain to the ordinary people was so great that the children did not die so fast. Later a number of causes reduced the birth rate, and we still find less children born at each census in proportion to the population. But never since the introduction of machinery has the lack of jobs been sufficient to cause a death rate among children comparable with what it was before.

Machines work in just the same way today. They take away jobs, but the increased efficiency produces new jobs faster. The only time when labor-saving machines cause unemployment is when the men are not able to take the new and better jobs that are offered, because of their own lack of ability and training.

—A. W. FORBES, *Forbes & Myers.*

A Friend at Court

Bringing in a friend to act as an understudy or assistant is very rarely a success. It usually creates a bad feeling in the shop, as the men feel he has been hired, not on merit, but merely favored as a friend.

Adams appoints Brown, his friend, as his assistant, and in return for that expects Brown to fall into all his ways, even to his ideas of moral character, and exactly to what extent he shall intermix with the men in social intercourse.

Brown, on the other hand, does not feel under the same restraint and discipline as he would under a stranger.

Adams is liable to become jealous of Brown. Perhaps he has selected him because of his pleasing personality, or for his ability to see things quickly. Knowing this, he becomes nervous whenever he sees Brown conversing with the manager, and is fearful that his job will be wrested from him.

Adams is also fearful that Brown will tell the men something of his private affairs, or past experiences where they have worked in shops together.

Another aspect, and by no means the least important, is to what extent their wives will figure in any controversy.

Adams may tell his wife of any lack of co-operation by Brown, with the result that Mrs. Adams will undoubtedly hint to Mrs. Brown of this failing, and if strained relations develop between the ladies, it is bound to react on the men.

—ALFRED C. LAYZELL.

Going Soft

I believe that labor really does deserve consideration from management when business is slack. Despite the glaring examples that may be cited of individual instances where labor has ignored the position of management and walked off the job in good times, leaving management to hold the bag, the final tally will show a vast preponderance of instances where labor has stuck to the job at its own personal disadvantage.

I don't believe it is so much a question of putting aside specific reserves when profits are big to keep workers going when sales are slow, as it is a case of intelligent balanced management at all times. When times are good, the force should not be expanded blindly, nor should it be reduced in like manner at the first sign of a slowing up of demand. Slack times are wonderful opportunities for taking stock all around—overhauling equipment, relocating machines for better production, repairing the plant in general, painting up, and doing the research, experiment, and development which are so necessary to the maintenance of industrial leadership.

—A. A. CROWELL.

Whistlin' Willie

Study of the effects of sound on persons has shown that whether one listens or not, the body consumes some energy as a result of the impinging of sound on the ear. The energy released causes some fatigue, as does any physiological process. This does not prevent the hearing of sound from being recreational; as when one listens to music of any kind.

In order that a man may be fully alive and alert, all faculties of mind and body must function so far as they can do so in harmony. A man who is thinking very hard on some problem would find sound very disturbing. But, undoubtedly, when one is doing work that has become automatic and requires only the casual attention of thought, a little occasional pleasant sound tends to facilitate work.

—E. SIMONSEN.

The Exception to the Rule

In fixing time rates, one of the biggest difficulties to be overcome is the difference in the ability of the individual. This is especially so in the case of jobs produced by hand work, such as fitting, tinsmithing and blacksmithing.

It is claimed that rates should be based on the performances of the average worker, and possibly this mythical person is in the mind of the ratefixer when he is fixing the time allowance.

When the job is put into production, however, it is extremely difficult to say whether the individual allocated to the job is of average ability without either reference to his past earnings or to comparisons of his performance against the performance of workers of known ability.

In fixing rates for jobs which have a preponderance of handwork the writer has found it a very useful expedient to consider that the job will be done by the very best workman working under the very best conditions, and to allocate for bonus the full percentage which he is prepared to pay for the operation, say 100 per cent.

Thus, in actual working, the discrepancies in the ability of workmen are accommodated, and the bonus may fluctuate between 100 per cent and bare time without enabling any workman to earn sufficient to warrant the consideration of a cut in the rate.

It is certainly beneficial to production, also for the morale of the shop, to abstain from lowering a rate once fixed, and in England we are prevented by an agreement with the trades unions from doing so without the institution of new facilities, equipment, or methods which speed up the workers.

—A. WILLIAMS, *Chief Estimator and Ratefixer, Bristol Motor Works, Bristol, England.*

CARE OF ELEVATORS

MARIN PHILLIPS
Electrical Superintendent,
International Paper Company

THE USES of elevators are such that they must be kept in the best of operating condition to safeguard the lives of passengers and prevent the interruption of production schedules. Reliable inspection and maintenance schedules alone can guarantee continuous safe service. The frequency of inspection will depend on the type of equipment, the severity of operating conditions, and their treatment in general.

Elevator inspection codes are available in some cities and states. They should be closely adhered to when making inspections, tests, repairs, and adjustments. By combining this code with the operating instructions furnished by the elevator manufacturer, and adding whatever practical experience has taught, one will have a very good maintenance schedule. All items of inspection gathered from the above sources should be incorporated on a printed form. Each item can then be checked off as the inspection is made.

To begin with, all items should be inspected weekly. Later it may be found that some parts can safely be left for longer periods between inspections, while a few may need it oftener than once a week.

Elevator inspection may be divided into the following points to receive attention:

MOTORS: Check clearance between rotor and stator, or armature and field coils for bearing wear. Check for excessive end thrust, caused by a worn or out-of-adjustment thrust bearing. Are foundation and coupling bolts tight? Check alignment of coupling. Inspect oil rings to see that they are turning properly. Are the oil well covers and dust cap in place to exclude dirt and grit? Are there any oil leaks around the shaft, oil gauge, drain plugs, etc.? Make insulation resistance test.

If a direct-current motor, do the brushes work freely in their holders? Are all brushes of the proper length, and are the shunts in good condition? Note whether brush arms are tight and properly spaced. Raise each brush by pulling on the shunt to see that the spring maintains the proper brush tension. This will also reveal any shunts loose in the brush. Is commutator dirty, cutting, or grooving? Where cutting is noticed look at the face of all the brushes until the one picking up copper is found. Are all parts clean, preventing insulation deterioration and current leaks? Clean thoroughly and paint before a dangerous stage is reached. Make insulation resistance test.

CONTROL EQUIPMENT: Change, or file, all burned contact fingers and segments to a smooth surface. Note whether contacts or switches drop out freely when the closing coil is de-energized. Examine all coils for baked or charred insulation. Do the armatures seat properly? This is essential on alternating current coils to prevent chattering or vibration, resulting in a short life of the coils and an objectionable noise in some locations. Are all actuating springs and flexible shunts in good condition? Oil all working parts that do not work freely. This is best accomplished by dipping a broom straw in the oil and putting a drop on the part that needs oiling. The oil can will most likely put on too much, a condition to be avoided. On controller fingers and large contacts, switch blades, etc., use a little vaseline as a lubricant after they are cleaned.

Next make sure all relays and under-

voltage devices are working properly. Check reverse power relays to see that they are functioning properly, to prevent reverse operation of the elevator motor in case of a reversal of power, brought about by wiring or polarity changes. Note the cleanliness of all control equipment and make an insulation resistance test. Are fire extinguishers mounted in handy places, filled and working properly?

SAFETY DEVICES: Inspect, adjust, and repair if needed, the limit switches at the top and bottom travel of elevator. Note whether the auxiliary switch operated by the governor flyballs is working properly and in good condition. Are the interlocks on car doors in good condition and working properly? If the doors are power operated, inspect all working parts for proper operation and make any adjustments necessary to insure this. Pay particular attention to see that the bottom limit switch is not in danger of filling with water due to leaks or pit filling up.

TESTING AND ADJUSTMENTS: Run car to the extreme upper limit of travel and note whether the limit switch stops it at the proper location. Now run the car to the extreme lower limit of travel and note whether the limit switch cuts the power off at the proper time. Try starting car from each floor with the elevator door open. If the car should start under this test it indicates a closed contact in the door safety switch. Test the emergency safety device inside the car to prevent stalling between floors in case of a fire or broken contact on one of the doors. Raise governor flyballs and note whether the rope jaws release, operating the auxiliary switch. Clean all safety devices thoroughly and make insulation resistance test.

CLEANLINESS: Cleanliness, and insulation resistance tests may seem to be over stressed, but so much depends on these two items, for safe and proper operation and long life of the equipment, that they cannot receive too much attention. Dirty equipment hides defects, deteriorates insulation, and takes the pride out of inspection and maintenance, causing the equipment to be neglected. Poor insulation of electrical equipment results in grounds and short-circuits. Either one may cause a limit switch or safety device to fail to work, cause the motor to start by itself, and, in extreme cases, cause the elevator to reverse in operation.

LUBRICATION: The first requisite to proper operation and long life of machinery is a good grade of lubricating oil and grease adapted to meet operating conditions. Inspect all bearings and grease cups regularly to see that the machinery is properly lubricated. On ring-oiled bearings inspect oil rings to see that they are in place and turning freely. Guide rails are sometimes lubricated by hand, and sometimes automatically. In either case, see that it is properly done, using the recommended lubricant. All hoisting ropes should be lubricated as directed by the elevator code, wire manufacturer, or elevator manufacturer's instructions. The guide sheave bearings should be well lubricated to insure free operation, thereby preventing undue wear of the ropes; also to make ropes "traction" properly. All mechanical safety devices should have their bearings, cams, links, and the like, properly lubricated to insure their free operation. The speed reducing unit casing should be kept filled to the proper height with the recommended lubricating oil, and should be refilled regularly with clean oil.

BRAKE: Proper operation of the car, as well as safety to the passengers, depends on the proper inspection, repairs, and adjustment of the brake. The brake must be positive in operation to prevent over travel at landings, necessitating undue starts and stops that mean extra time and wear on the equipment. However, the adjustments must not cause the car to stop too suddenly. Watch brake shoes to see that they do not drag on the drum. See that the brake releases properly when current is applied to the motor. Inspect all actuating springs to see that they are in place and functioning properly.

MECHANICAL SAFETY DEVICES: Inspect governor and note its operation. Inspect guide safety shoes and note their condition. Examine oil buffers, where they are in use, to see that they are filled to the proper height with oil. Do all doors properly latch? All exposed set screws should be of the safety type.

GENERAL: Inspect all hoisting ropes for broken strands and note their condition where they connect in sockets for lifting the car and counter weights.

Cable drum: Watch for worn grooves, denoting side traction. Inspect for lost motion, caused by worn bearings, or looseness on shaft, gear looseness on spider, worn gear teeth. Note whether collars or thrust bearings have slipped. Examine spokes and rims for cracks.

Examine guide sheaves to see that they are properly aligned, insuring correct rope traction.

Note whether all foundation bolts are tight. Also those on bearing pedestals and bearing caps. Are all dowel pins in place to prevent any shifting of parts?

Thrust bearing: Examine, adjust, repair, or renew, as condition warrants. Note whether it is being properly lubricated.

Examine all set screws to see that none are missing, loose, or broken. Examine all keys to see that they are not loose.

Inspect all gears, including the speed reducer unit, to see that they are properly lubricated and in good condition. See that packing gland is tight on speed reducer unit to prevent loss of oil. Note whether any other oil leaks are present. Remove top half of gear case and inspect gearing. Note condition of oil pipes and grooves for the lubrication of its bearings.

Guide shoes: Are they in good condition, or badly worn? Note whether there is a chance for bolts to work loose and project in their way.

Hoisting: Note the general strength and wear of parts. Inspect very closely all cable connections.

As with the electrical, the cleanliness of all mechanical equipment is necessary in order to insure proper inspection, repairs, and adjustments. Many impending hazards are easily hid by dirt, oil, and grease.

■

The manufacture of springs grew from a factory for manufacturing tempered-steel hoopskirt frames, established in 1857.

■

Every employee having occasion to work near oxygen tanks should be warned of the explosive properties of grease or oil when brought into contact with oxygen.

Change Gears for Gear Cutting

Discussion

SAM TRIMBATH
Gear Engineer, Willys-Morrow Company

GEAR CUTTING machines are not usually equipped to cut prime numbers of teeth over 100. For this reason the article by John Thomas in *American Machinist* (Vol. 73, page 894) was timely and interesting. However in "omitting the calculations necessary to find the approximate ratio," Mr. Thomas excluded one of the useful phases of the discussion.

Factor tables, the first of which is shown on page 409, can be used to advantage for this purpose and many others such as calculating feed change gears for hobbing machines, ratio roll gears for Gleason Spiral Type generators, and for cutting threads on thread millers or lathes. To illustrate the utility of this table several examples are given.

Example 1

To obtain a feed of 0.0376875 on a No. 3 Barber-Colman hobbing machine:

$$\text{Feed gear formula—}\ \frac{\text{Feed}}{0.075} = \frac{\text{Drivers}}{\text{Driven}}$$

$$\frac{0.0376875}{0.075} = 0.502500$$

The nearest fraction in the table of decimal equivalents is

$$\tfrac{1}{2} = 0.500000$$

$$0.502500 - 0.500000 = 0.002500$$

And

$$\frac{0.502500}{0.002500} = 201.$$

Hence nearest figure is $\frac{1}{201}$ too small.

To correct:

Multiply $\frac{1}{2}$ by $\frac{201}{200}$

$$\tfrac{1}{2} \times \frac{3 \times 67}{8 \times 25} = \frac{45}{80} \times \frac{67}{75} = \frac{\text{Drivers}}{\text{Driven}}$$

To prove the feed correct:

$$\frac{45}{80} \times \frac{67}{75} \times 0.075 = 0.0376875$$

In the above example, the consecutive numbers 200 and 201 could be factored. If they could not be broken down to numbers small enough for change gears, as in the next example, the consecutive numbers nearest them that can be factored are the best obtainable with four change gears.

Example 2

To obtain a feed of 0.050911 on a No. 5A Lees-Bradner gear generator:

$$\text{Feed Gear Formula—}\ \frac{\text{Feed}}{0.125} = \frac{\text{Drivers}}{\text{Driven}}$$

$$\frac{0.050911}{0.125} = 0.407288$$

The nearest fraction in the table of decimal equivalents is:

$$11/27 = 0.407407$$

$$0.407407 - 0.407288 = 0.000119$$

$$\frac{0.407407}{0.000119} = 3{,}423$$

Hence nearest figure is $\frac{1}{3{,}423}$ too large.

Factors for $\frac{3{,}422}{3{,}423} = \frac{2 \times 29 \times 59}{3 \times 7 \times 163}$

Since a change gear with 163 teeth would be too large, we glance through the consecutive numbers given for numbers having a factor 11 in the larger or 3 in the smaller or both. This enhances the probability that the change gears will have small enough tooth numbers. The figures selected are 3431 and 3432.

$$\text{Hence}\ \frac{11}{27} \times \frac{3{,}431}{3{,}432} = \frac{11}{27} \times \frac{47 \times 73}{8 \times 3 \times 11 \times 13}$$

Cancelling the 11's we have:

$$\frac{47 \times 73}{108 \times 78} = \frac{\text{Drivers}}{\text{Driven}}$$

To prove the feed correct:

$$\frac{47 \times 73}{108 \times 78} \times 0.125 = 0.050911$$

It is the practice of the Willys-Morrow Company when developing a pair of Gleason Spiral Type Bevels, to cut the master gears that control production first. In this we insist on having the gears and pinions cut to summary figures and show the correct vertical bearing location without deviating from the summary figures more than 0.001. Should the error be greater than this, the cause is ascertained—either the summary figures are incorrect, the test machines vertical position incorrect or the cutting machines are not in proper condition to produce masters. When they come well within this limit we have an assurance that the job is started right.

In the above, we practice what is termed "Bias Removal" obtained in the customary manner through a change in the ratio roll. The amount of "Bias" removed must be carefully calculated, and in this, the table is very useful. The following example is selected in order to show the possibilities in this use of the table.

Example 3

To obtain the change gears for a pinion having a pitch angle whose cosecant is 4.7467:

The formula for ratio roll change gears is:

Change gear ratio = 0.3 × cosecant pitch angle

$$4.7467 \times 0.3 = 1.42401$$

The nearest fraction for the decimal 0.42401 is:

$\frac{14}{33} = 0.42424$ or for 1.42424 it is:

$$\frac{14 + 33}{33} = \frac{47}{33}$$

$$1.42424 - 1.42401 = 0.00023$$

$$\frac{1.42424}{0.00023} = 6192$$

Hence nearest figure is $\frac{1}{6,192}$ too large.

To correct, multiply $\frac{47}{33}$ by $\frac{6,191}{6,192}$

6191 cannot be factored into reasonably sized change gears.

As we glance through the table for figures near these, we look for one that has a factor 47 in the larger and that has a factor of 33 in the smaller.

$$\frac{47}{33} \times \frac{6,391}{6,392} = \frac{47}{33} \times \frac{7 \times 11 \times 83}{8 \times 17 \times 47}$$

Cancelling, we have left:

$\frac{7 \times 83}{24 \times 17}$ or in change gear sizes $\frac{42}{48} \times \frac{83}{51} = 1.42401$

It is not necessary that we select these particular figures, and in case we had difficulty in finding what was wanted, we might have looked further and selected:

$$\frac{47}{33} \times \frac{5,451}{5,452} = \frac{47}{33} \times \frac{3 \times 23 \times 79}{4 \times 29 \times 47}$$

Cancelling, we have left:

$\frac{23 \times 79}{44 \times 29}$ in change gear sizes $\frac{46}{58} \times \frac{79}{44} = 1.42398$

$$1.42401 - 1.42398 = 0.00003$$

Reducing the error from 0.00023 to 0.00003.

From the above it can be seen that a table containing only consecutive prime numbers and factors where the largest figure is not over 97, provides a ready method for accurate change gear calculation and reduces the amount of labor involved materially. Approximately 8,000 numbers out of 10,200 cannot be factored, have factors too large for change gear sizes, or have no numbers preceding or following them that can be reduced to small enough factors.

■

Cutting Speed Chart—*Discussion*

E. A. Terrell
The Terrell Machine Company

WE ARE possibly making somewhat peculiar use of the "Cutting Speed Chart" which appeared on page 257 of the present volume of *American Machinist*, but it is one which we believe other small plants could make to advantage. We are checking our speeds and comparing them with the theoretical speeds given by the chart. The results have been closer than we anticipated, and we now expect to begin using figures from the chart in giving a machine operator instructions regarding any part to which the figures are applicable. In other words, on a new part for which we have prepared an instruction card, we will indicate the theoretical speed. We believe it will save the operator a good deal of time in experimenting in order to arrive at the most economical speed.

Flat Belt vs. V-Belt Drives on Planers

J. L. DeRabot
Consulting Engineer
Alexander Brothers, Inc.

AN ARTICLE on the merit of V-belt against flat belt on planer drives appeared on page 815, Vol. 73, of *American Machinist*. Curves shown with that article would seem to demonstrate that the V-belt is more efficient than the flat belt for this particular kind of work. However, an analysis of the subject shows that the comparison bears chiefly between two different mechanical arrangements of the drive in which the type of belt used in each case has very little to do with the final performance.

In the first case, the common system of shifting belts described is not ideal. The continual shifting imposes a very heavy strain upon the belts, and the loss of time between the return and the cutting stroke is entirely due to the unavoidable resistance caused by this shifting. The difficulty of this operation is that the belt must pull hard during the cutting stroke and should let go at the time of the shifting. Therefore, there are two requirements which are opposed to each other; that is, no slip when the belt has to pull the load, and slip when it is being shifted.

Since such qualities cannot be found in any one belt, the practice is to take an average between the two by selecting a belt having a coefficient of friction neither too high nor too low. These belts are comparatively narrow on account of the shifting pulleys and are usually heavy on account of the abuse to which they are subjected.

In the second case, I see a new solution of the problem whereby shifting belts are eliminated and the reciprocal motion is obtained through the use of a reversing motor. There is no question that such a system, with the proper type of motor, must be more satisfactory than the shifting belts. It may be that V-belts are best for use with the reversing motor, but if so it is not for the reasons mentioned in the article; namely, positiveness and efficiency of the drive.

Tests are available to show that multiple V-belt drives are neither efficient nor positive. Yet under heavy slippage they will stand up better than flat belts and they will not jump off the pulleys since they are strongly imbedded in grooves—all of which too often gives the illusion that everything is well when it is not.

What is a drawback on ordinary drives may be an advantage in the case of a planer where a certain amount of slip is desirable when the motion is reversed. As to the pulling requirements, it is undoubtedly possible to help the situation by using enough V-belts, since there is practically no limit in the width of face of the pulleys as is the case for shifting belts. I observe that the illustration shows the motor equipped with 6 V-belts, or the equivalent of approximately a flat belt 6 in. or more wide. On this basis, in order to give a true aspect of the situation, it would be interesting to know whether a good double-ply leather belt with a moderate coefficient of friction would not, with the reversing motor, give a performance equal or superior to the V-belt drive at a smaller cost. A belt with a high coefficient of friction and a high efficiency would not be suitable for this kind of work because it would be too positive.

IDEAS FROM PRACTICAL MEN

A Difficult Job of Stamping

CHARLES H. WILLEY
Assistant Plant Superintendent,
Hoyt Electrical Works

THE PRODUCTION of odd-shaped parts, such as the brass piece shown at *A*, Fig. 1, presents quite a problem when they are to be made in one operation after blanking. There are ears and other parts to be bent, and holes to be pierced. After a careful study, the press tools illustrated were designed for the production of the part referred to, and they have performed excellently. While a detailed description of their construction must be limited in an article of this short length, a study of the illustrations should suffice to show the details plainly.

The blank *B* is placed in the die *C*, as indicated by the dotted lines. Beneath the die is a pressure pad that holds section *D* up until the forming of the part has been completed. Then the section travels downward $\frac{1}{16}$ in., permitting the punches *E* and *H*, in the view at the right, to pierce the holes *J* and *K*, and other punches to make bosses, or indents, at *L* and *M*. When the punch proper reaches a point about $\frac{3}{8}$ in. from the bottom of the stroke, the pilot pins *N* and *O* enter holes in the die and line up both members to prevent the small punches from being sheared.

The punch is sectionally built and is shown in detail in Fig. 2 to clearly indicate its parts. There are two movable sections, *A* and *B*. Section *A* is actuated by the rubber pad *C* to strip the work from the punches *E* and *H*. Section *B* functions likewise to strip the work from the forming and the indenting punches, but is actuated by the spring *J*. In Fig. 3 is shown how the die is held up by the pressure pad, and also how the work is stripped by the corners *R* and *S*, Fig. 1. The plate and the spring shown do the work by actuating the pins of the rectangular strippers in the die slots.

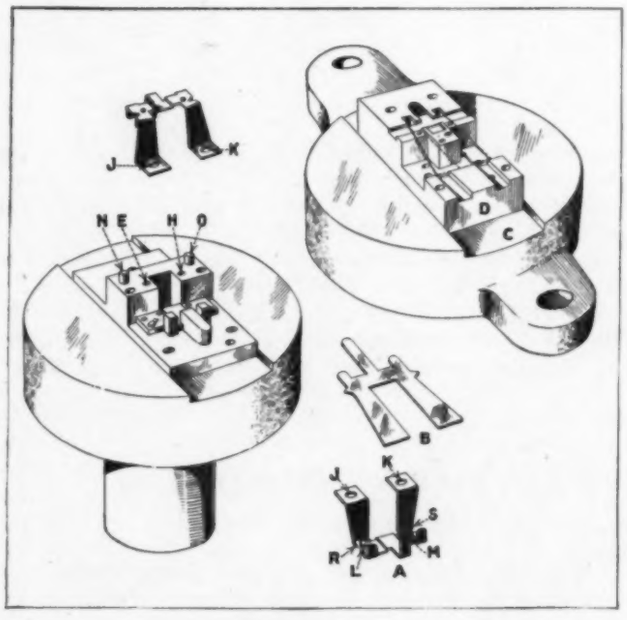


Fig. 1

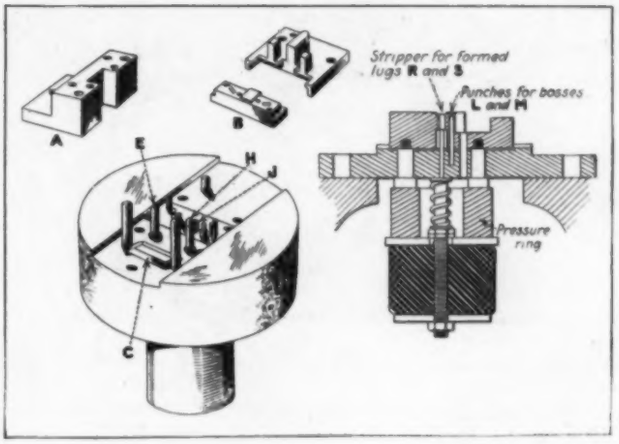


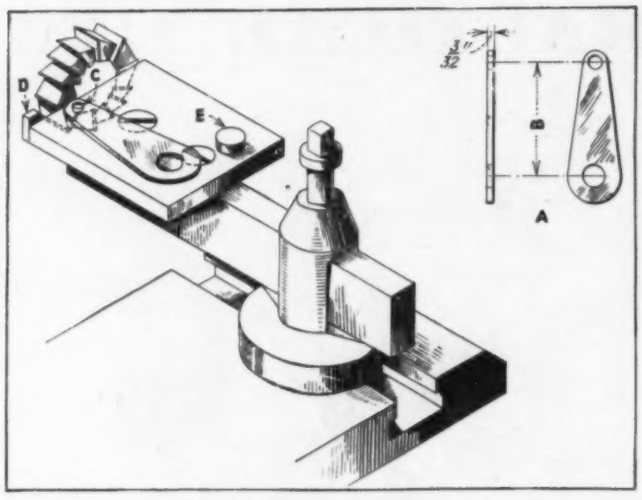
Fig. 2 Fig. 3

The pieces so formed and pierced are used as supports in the movements of dash ammeters. Their production by the tools described is at the rate of 700 per hour, with a total of about 50,000 pieces to date. The tools being comparatively new, a longer record has not been made as yet. The punches have not required sharpening to date. We feel well repaid for the expense of the tools, for the completion of the work in one stroke of the press gives us parts that assemble easily. Frail parts, such as these, when made in several operations, are likely to become sprung in handling them from press to press, and thus be hard to assemble. There is also the added danger of spoiling them by not getting them properly located in the different dies.

Fixture for Rounding the Ends of Small Parts

HENRY W. BOEHLY
Machine Designer,
Mergenthaler Linotype Company

When building special machines on contract, analyzing the job to find out the best method of machining the parts is very important, especially if the cost is to be kept out of the red. We had to make several dozen only of parts like the one shown at *A*. Since the quantity was small, and the dimension *B* was variable, making press tools for the job was out of the question. A strip of stock of the same width as the length of the parts was cut from a sheet in the usual manner. The blanks were cut from the strip in a power shear by feeding the strip at the required angle and alternately flopping it over for



each piece. The holes were pierced in a set of press tools that were always kept in working order, for piercing holes in similar work was almost a daily occurrence. It was necessary only to make a new nest for the piece.

After reaming the holes, the ends were rounded in the lathe, using the fixture shown in the illustration. The fixture consists of a shank to fit the toolpost, and on the top is a removable plate containing two pins. The small end of the piece was slipped over the pin *C* and fed up to the cutter, which was held on an arbor in the spindle. By slowly swinging the piece by hand until it contacted the stop *D*, one-half of the end was rounded. The piece was then turned over on the pin and the other half was rounded in the same manner. After the small ends of all the pieces had been rounded, the plate containing the pins was removed and replaced in the reverse position, bringing the pin *E* next to the cutter. By putting the large end of the piece over this pin, its end was rounded by repeating the operation on the small end. A stop on the shears of the lathe served to locate the carriage for the correct depth of cut.

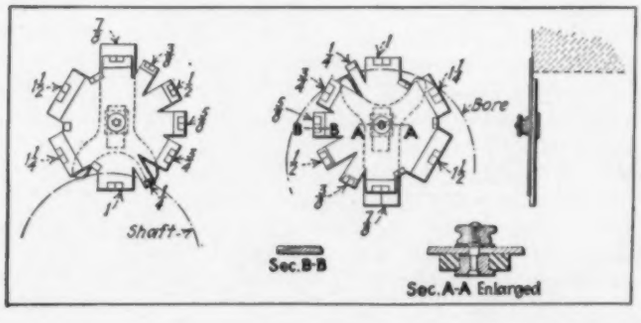
■

Gage for Laying Out Keyways

K. Takahashi
Tokyo, Japan

The gage shown in the illustration can be used for laying out both external and internal keyways. It consists of a plate having templets for keyways of various sizes disposed in a circle, arranged to revolve and slide upon a lower plate having centering arms, and to be locked thereto by a knurled nut. To set any one of the templets truly radial, bring the one diametrically opposite to it so that its center line coincides with the center line on the plain end of the lower plate.

With the centering arms of the lower plate in contact with the wall of a hole, as shown at the right, or with the exterior of a shaft, as shown at the left, the upper plate is slid upon the lower one until the transverse line scribed on the templet to be used coincides with the circumference of the hole, or the shaft. With the templet locked in this position, lines scribed around its sides and end on the work will show the correct position of the keyway to be cut, also its correct width and depth.



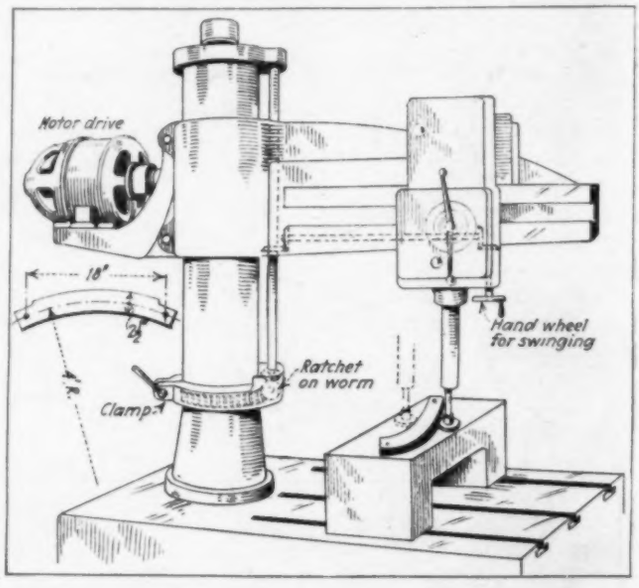
■

Radius Link Grinding

James H. Ayre
St. Catherines, Ontario, Canada

Radius links such as shown at *A* work in pairs and must be absolutely smooth and parallel. It was necessary to machine these links in a small jobbing shop not equipped with a radius planing attachment or a lathe large enough to swing them.

The links were machined all over except the radius edges which were roughed to $\frac{1}{32}$ in. of the finished size in a vertical milling machine. They were then transferred to an Asquith radial drill and clamped to the work table in pairs at the desired 4-ft. radius to the bolt circle. A medium-grade grinding wheel was mounted in the drill spindle. The radial arm was swung using the wormwheel on the pillar. At the end of each stroke, the spindle was reversed and fed downward. Both edges of each link were finished with satisfactory results.



■

Another Putting-On Tool

John J. McHenry

Much has been written about different methods of shrinking the holes in die-rings, either to get more life from used dies, or to save a new die that has gone wrong in the making. I have yet to read anything as to how

to make the outside of a die-ring larger, aside from the occasional "Putting-on Tool" stuff regarding either chromium plating, or knurling.

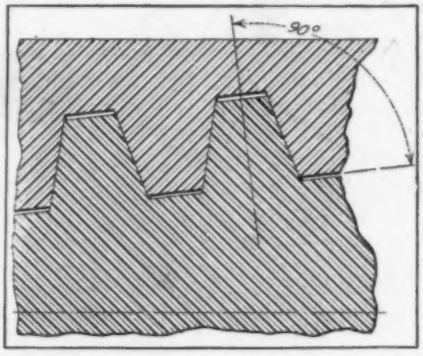
Here is how we made the outside of an 11-in., oil-hardened ring larger by $\frac{1}{64}$ in. The ring had a 7-in. hole and was $1\frac{3}{8}$ in. thick. A machine-steel disk was turned 0.025 in. larger than the hole in the ring. The ring was put in the furnace and heater to 1,100 deg. F. The disk was entered into the furnace and dropped in the expanded hole of the ring. The temperature was then run up to 1,400 deg. F. and the gas was shut off, allowing the parts to cool off in the furnace. The expansion of the disk enlarged the red-hot ring. Afterward, the ring was hardened without more than the usual distortion in parts of the kind. I have no doubt that there are many cases where this method could be employed.

■

Acme Taper Thread

FRANK A. STANLEY

Ask any machinist (not acquainted with oil tool shop practice) whether an Acme taper thread should be cut normal to the axis or normal to the taper slope; usually, he will reply that it should be cut square to the axis. Many others interested in manufacture have held the view that the thread, like the Briggs pipe thread, should be cut with the threading tool set at ninety degrees to the axis of the work. A little consideration of the problem will indicate that the flats on the Acme thread at top and bottom necessitate that these top and bottom surfaces be cut parallel to the slope of the taper piece whether male or female. To do this, the threading tool must be set at ninety degrees to that slope. Otherwise interference will occur between the top corner of the thread and the corresponding corner at the bottom of the groove unless excessive clearance be provided.



A glance at the sketch will show this point. A section through the thread shows the Acme thread symmetrical about its own center line with the top of the thread and the bottom of the thread groove parallel as they would appear with the threaded plug screwed into the box or external member.

The Hughes Tool Company, when they developed their well known Acme thread tool joint, adopted a taper 8 deg. to the center line or an included angle of 16 deg. Expressed in taper per foot this works out at $3\frac{3}{8}$ in. or $\frac{9}{32}$ in. taper per inch of length. This taper is about $4\frac{1}{2}$ times as steep as the Briggs pipe taper. The purpose of all steep taper oil tool threads is of course to permit the joints to be made up and broken quickly; with the joint referred to less than four turns suffices for the operation. The Hughes Acme thread joint has four threads per inch for all sizes of joints.

So far as the fit of the threads is concerned it is the same as a straight Acme job. In practice, the regular Acme straight thread is made with a clearance of 0.010 in. top and bottom of the thread. Similarly the Hughes Acme taper thread is made with 0.010 in. clearance top and bottom. The thread form itself therefore does not differ from Acme standard dimensions.

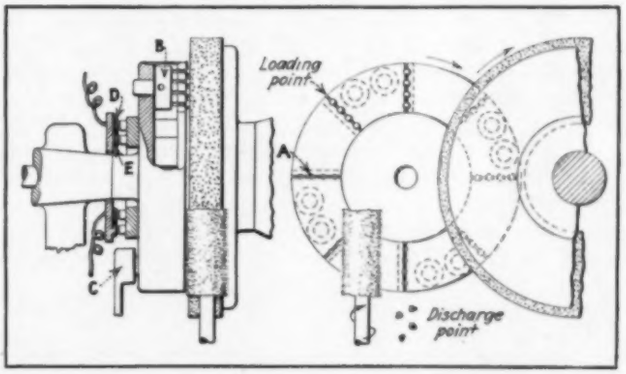
■

A Special Magnetic Chuck for the Rapid Grinding of Small Parts

J. F. CAVANAGH
Mechanical Engineer

Means for holding very small parts that require grinding often present a difficult problem. Special magnetic chucks may frequently be utilized to advantage for such work. The illustrations show such a chuck arranged for grinding the bases of contact points preparatory to receiving the little disks of tungsten. This particular work calls for a clean job within close limits, and the operation must necessarily be speedy and economical. In this case a small disk-grinder is used and it, of course, must be in first-class condition, care being taken that there is no lost motion endwise.

The chuck is of the rotary type, and is provided with a ring of magnetic poles so connected as to be "dead," or unmagnetized, when passing through the positions for releasing the work, and to become magnetized when passing through the loading and grinding positions. The essentials of the arrangement to meet the requirements for most of the work of this character are shown in the illustrations. The only change necessary is in the pole pieces, which must be designed to accommodate the particular pieces to be ground. Referring to the drawings, Fig. 1 is a side elevation in partial section of the chuck and the grinding wheel. Fig. 2 is an end view, while Fig. 3 is a diagram of the electrical connections. In



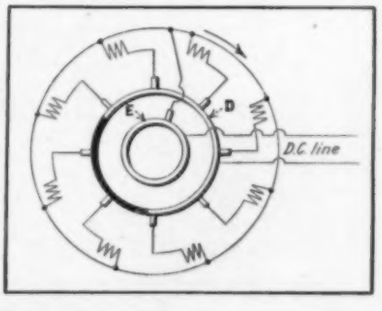


Fig. 1—Upper left

Fig. 2—Above

Fig. 3—Left

this particular instance, the chuck is provided with eight poles, or work-gripping members, energized by four pairs of electromagnets, this detail being governed by conditions.

Recesses between the poles are provided for the shanks of the work, as shown at *A*, Fig. 1, and a spring-returned plunger *B* is arranged to positively eject the parts after grinding, through the action of the cam-controlled shoe *C*. A rotary brush may be utilized to remove the dust from the poles when in their "dead" positions, although I have used an air jet, which is usually a shop accessory. Two collector rings, *D* and *E*, are concentric with the spindle and with each other, and transmit current to the coils through suitable sliding contacts, or brushes. The connections are clearly indicated in Fig. 3, and it will be seen that the outer ring *D* is provided with an insulated portion corresponding to the discharge and dust-removing position of the poles.

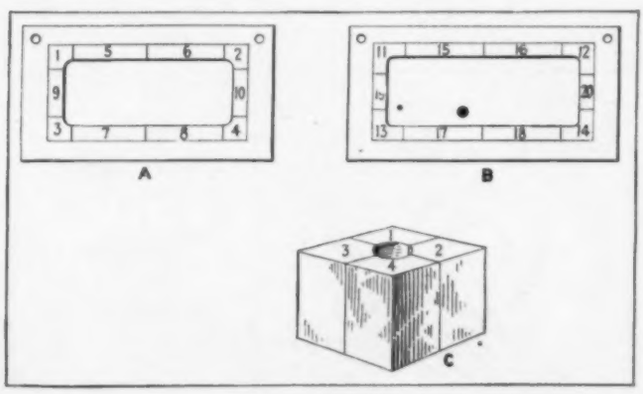
Since the length of grinding-wheel contact is ample, the rotating speed of the chuck is dependent upon how fast the parts can be loaded. Intermittent motion may readily be provided to facilitate loading, but a slow, continuous motion offers no difficulty to the rapid placing of the parts. As the current usually available is 110 volt, d.c., it is necessary to give the matter of coils careful attention to insure the greatest amount of grip. Since the current consumption involved is never of consequence, one can occasionally utilize ready-made coils of lower voltage specifications, and insert external resistance in the line to prevent overheating and possible burning out of the windings.

Die Design

F. J. WILHELM

There is a right and a wrong way to design and build dies of the sectional type, whether they are for blanking or forming. The right way is shown at *A*, in the illustration, while the wrong way is shown at *B*. In the sketch *A* the four corner pieces are symmetrical and can be put together, as at *C*, for boring and grinding the hole that will leave the fillet in each piece. The corner pieces in the die at *B* are not symmetrical and cannot be so put together.

It is well known that symmetrical pieces will change their shapes less in heat-treating than will unsymmetrical ones. Thus the corner pieces in the die at *A* will retain their shape in heat-treating better than will those in the die at *B*. The fillets can be machined easily.



SEEN AND HEARD

T-C Tools

IT'S AMAZING how much misinformation there is floating around the country. One boosts tungsten carbide for nearly everything, the next hasn't found it good for anything but non-ferrous metal or non-metallic substances, while a third says it always goes to pieces on intermittent cuts.

As an example, I found good-sized cast-iron slotted plates being turned at 160 ft. a minute. Steel was being given a finishing cut with T-C tools, although roughed with high-speed steel, and there were numerous other examples. T-C was not used in boring tools in this shop because of the overhang and vibration in this work.

It is quite probable that each kind of cutting tool has its economic field and that we are learning what these fields are. The different fields may even overlap occasionally. When we realize that few devices on tools are best for everything, and sort out the right jobs for each, we'll be nearer real economy.

Grinding Small Cone Points

GRINDING a small tapered point isn't as simple a job as it appears. One of the difficulties is the difference in surface speed of the cone between the large diameter and the point. In fact, the speed at the extreme point is almost nil, and this makes a decided difference in the surface produced. Both the wheel spindle bearing and the bearing of the work spindle must be as snug as possible, and the work spindle speed as high as can be secured. Before you bid on a job of this kind try out a few and see how they come out. —*J.R.G.*

Something New

THERE IS an engineer working over in Jersey in a little shop who has grafted a punch press to a wire bender. The result of the hybrid is that he can run two rolls of strip material through, make two different parts, and assemble them together with a third part fed in from a hopper, all at the rate of about 600 a minute.

He does not make his dies in the ordinary way. He uses a strip of the exact width of the blank and cuts away the outside at various steps. In this way he has no continuous scrap to get rid of, his feed is a variation of the slide method and is accurate and positive. It is set by a micrometer adjustment.

This man showed me some mighty interesting examples of single and multiple bending and assemply work, but asked me not to mention them specifically at present. Suppose, as an example, you wanted to make one of those small tin boxes that Aspirin tablets come in. You would set up two reels of lithographed tin and the completed boxes would come out at the rate of six hundred a minute. By utilizing the hopper feed for the tablets you could probably have the boxes come out full. Remember too, that these boxes are hinged. —*H.*

Consecutive Number Factors for Change Gear Calculation—I

Computed by Sam Trimbath for calculations shown on page 403 of this number

8	2^3	147	$3x7^2$	290	$2x5x29$	460	2^2x5x23	663	$3x13x17$	885	$3x5x59$	1185	$3x5x79$
9	3^2	148	2^2x37	291	$3x97$	464	2^4x29	664	2^3x83	890	$2x5x89$	1188	2^2x3^2x11
10	$2x5$	152	2^3x19	292	2^2x73	465	$3x5x31$	665	$5x7x19$	891	3^4x11	1189	$29x41$
14	$2x7$	153	3^2x17	294	$2x3x7^2$	468	2^2x3^2x13	666	$2x3^2x\ 7$	896	2^7x7	1190	$2x5x7x17$
15	$3x5$	154	$2x7x11$	295	$5x59$	469	$7x67$	667	$23x29$	897	$3x13x23$	1196	$2^2x13x23$
16	2^4	155	$5x31$	296	2^3x37	470	$2x5x47$	670	$2x5x67$	899	$29x31$	1197	3^2x7x19
20	2^2x5	156	2^2x3x13	297	3^3x11	472	2^3x59	671	$11x61$	900	$2^2x3^2x5^2$	1206	$2x3^2x67$
21	$3x7$	158	$2x79$	299	$13x23$	473	$11x43$	672	2^5x3x7	901	$17x53$	1207	$17x71$
22	$2x11$	159	$3x53$	300	2^2x3x5^2	474	$2x3x79$	675	3^3x5^2	902	$2x11x41$	1209	$3x13x31$
24	2^3x3	160	2^5x5	301	$7x43$	475	5^2x19	676	2^2x13^2	903	$3x7x43$	1210	$2x5x11^2$
25	5^2	161	$7x23$	304	2^4x19	476	2^2x7x17	679	$7x97$	912	2^4x3x19	1215	3^3x5
26	$2x13$	162	$2x3^4$	305	$5x61$	477	3^2x53	680	2^3x5x17	913	$11x83$	1216	2^6x19
27	3^3	164	2^2x41	306	$2x3^2x17$	480	2^5x3x5	688	2^4x43	923	$13x71$	1218	$2x3x7x29$
28	2^2x7	165	$3x5x11$	315	3^2x5x7	481	$13x37$	689	$13x53$	924	$2^2x3x7x11$	1219	$23x53$
32	2^5	166	$2x83$	316	2^2x79	483	$3x7x23$	690	$2x3x5x23$	925	5^2x37	1220	2^2x5x61
33	$3x11$	168	2^3x3x7	318	$2x3x53$	484	2^2x11^2	696	2^3x3x29	930	$2x3x5x31$	1221	$3x11x37$
34	$2x17$	169	13^2	319	$11x29$	485	$5x97$	697	$17x41$	931	7^2x19	1222	$2x13x47$
35	$5x7$	170	$2x5x17$	320	2^6x5	486	$2x3^5$	702	$2x3^3x13$	935	$5x11x17$	1224	2^3x3^2x17
36	2^2x3^2	171	3^2x19	322	$2x7x23$	492	2^2x3x41	703	$19x37$	936	2^3x3^2x13	1225	5^2x7^2
38	$2x19$	172	2^2x43	323	$17x19$	493	$17x29$	704	2^6x11	943	$23x41$	1239	$3x7x59$
39	$3x13$	174	$2x3x29$	324	2^2x3^4	494	$2x13x19$	705	$3x5x47$	944	2^4x59	1240	2^3x5x31
40	2^3x5	175	5^2x7	325	5^2x13	495	3^2x5x11	710	$2x5x71$	945	3^3x5x7	1241	$17x73$
44	2^2x11	176	2^4x11	328	2^3x41	496	2^4x31	711	3^2x79	946	$2x11x43$	1242	$2x3^3x23$
45	3^2x5	177	$3x59$	329	$7x47$	497	$7x71$	712	2^3x89	948	2^2x3x79	1245	$3x5x83$
46	$2x23$	178	$2x89$	330	$2x3x5x11$	498	$2x3x83$	713	$23x31$	949	$13x73$	1246	$2x7x89$
48	2^4x3	181	2^2x3^2x5	332	2^2x83	506	$2x11x23$	714	$2x3x7x17$	950	$2x5^2x19$	1247	$29x43$
49	7^2	182	$2x7x13$	333	3^2x37	507	$3x13^2$	715	$5x11x13$	960	2^6x3x5	1248	2^5x3x13
50	$2x5^2$	183	$3x61$	335	$5x67$	510	$2x3x5x17$	725	5^2x29	961	31^2	1260	2^2x3^2x5x7
51	$3x17$	184	2^3x23	336	2^4x3x7	511	$7x73$	726	$2x3x11^2$	962	$2x13x37$	1261	$13x97$
52	2^2x13	185	$5x37$	340	2^2x5x17	512	2^9	728	2^3x7x13	968	2^3x11^2	1264	2^4x79
54	$2x3^3$	186	$2x3x31$	341	$11x31$	513	3^3x19	729	3^6	969	$3x17x19$	1265	$5x11x23$
55	$5x11$	187	$11x17$	342	$2x3^2x19$	516	2^2x3x43	730	$2x5x73$	970	$2x5x97$	1271	$31x41$
56	2^3x7	188	2^4x47	343	7^3	517	$11x47$	731	$17x43$	975	$3x5^2x13$	1272	2^3x3x53
57	$3x19$	189	3^3x7	344	2^3x43	518	$2x7x37$	732	2^2x3x61	976	2^4x61	1273	$19x67$
58	$2x29$	190	$2x5x19$	345	$3x5x23$	527	$17x31$	735	$3x5x7^2$	979	$11x89$	1274	$2x7^2x13$
62	$2x31$	194	$2x97$	350	$2x5^2x7$	528	2^4x3x11	736	2^5x23	980	2^2x5x7^2	1275	$3x5^2x17$
63	3^2x7	195	$3x5x13$	351	3^3x13	529	23^2	737	$11x67$	986	$2x17x29$	1276	$2^2x11x29$
64	2^6	196	2^2x7^2	352	2^5x11	530	$2x5x53$	738	$2x3^2x41$	987	$3x7x47$	1280	2^8x5
65	$5x13$	200	2^3x5^2	354	$2x3x59$	531	3^2x59	740	2^2x5x37	988	$2^2x13x19$	1281	$3x7x61$
66	$2x3x11$	201	$3x67$	355	$5x71$	532	2^2x7x19	741	$3x13x19$	989	$23x43$	1287	$3^2x11x13$
68	2^2x17	203	$7x29$	356	2^2x89	533	$13x41$	742	$2x7x53$	990	$2x3^2x5x11$	1288	2^3x7x23
69	$3x23$	204	2^2x3x17	357	$3x7x17$	534	$2x3x89$	747	3^2x83	999	3^3x37	1295	$5x7x37$
70	$2x5x7$	205	$5x41$	360	2^3x3^2x5	539	7^2x11	748	$2^2x11x17$	1000	2^3x5^3	1296	2^4x3^4
74	$2x37$	207	3^2x23	361	19^2	540	2^2x3^3x5	759	$3x11x23$	1001	$7x11x13$	1311	$3x19x23$
75	$3x5^2$	208	2^4x13	363	$3x11^2$	549	3^2x61	760	2^3x5x19	1007	$19x53$	1312	2^5x41
76	2^2x19	209	$11x19$	364	2^2x7x13	550	$2x5^2x11$	767	$13x59$	1008	2^4x3^2x7	1325	5^2x53
77	$7x11$	210	$2x3x5x7$	365	$5x73$	551	$19x29$	768	4^3x3	1014	$2x3x13^2$	1326	$2x3x13x17$
78	$2x3x13$	212	2^2x53	366	$2x3x61$	552	2^3x3x23	774	$2x3^2x43$	1015	$5x7x29$	1330	$2x5x7x19$
80	2^4x5	213	$3x71$	368	2^4x23	553	$7x79$	775	5^2x31	1022	$2x7x73$	1331	11^3
81	3^4	215	$5x43$	369	3^2x41	558	$2x3^2x31$	776	2^3x97	1023	$3x11x31$	1332	2^2x3^2x37
82	$2x41$	216	2^3x3^3	370	$2x5x37$	559	$13x43$	777	$3x7x37$	1024	2^{10}	1333	$31x43$
84	2^2x3x7	217	$7x31$	371	$7x53$	560	2^4x5x7	779	$19x41$	1025	5^2x41	1334	$2x23x29$
85	$5x17$	219	$3x73$	372	2^2x3x31	561	$3x11x17$	780	$2^2x3x5x13$	1026	$2x3^2x19$	1335	$3x5x89$
86	$2x43$	220	2^2x5x11	374	$2x11x17$	567	3^4x7	781	$11x71$	1027	$13x79$	1342	$2x11x61$
87	$3x29$	221	$13x17$	375	$3x5^3$	568	2^3x71	782	$2x17x23$	1034	$2x11x47$	1343	$17x79$
88	2^3x11	222	$2x3x37$	376	2^3x47	574	$2x7x41$	783	3^3x29	1035	3^2x5x23	1344	2^6x3x7
90	$2x3^2x5$	224	2^5x7	377	$13x29$	575	5^2x23	784	2^4x7^2	1036	2^2x7x37	1349	$19x71$
91	$7x13$	225	3^2x5^2	378	$2x3^3x7$	576	2^6x3^2	792	2^3x3^2x11	1037	$17x61$	1350	$2x3^3x5^2$
92	2^2x23	230	$2x5x23$	384	2^7x3	580	2^2x5x29	793	$13x61$	1044	2^2x3^2x29	1352	2^3x13^2
93	$3x31$	231	$3x7x11$	385	$5x7x11$	581	$7x83$	798	$2x3x7x19$	1045	$5x11x19$	1353	$3x11x41$
94	$2x47$	232	2^3x29	387	3^2x43	582	$2x3x97$	799	$17x47$	1053	3^4x13	1357	$23x59$
95	$5x19$	234	$2x3^2x13$	388	2^2x97	583	$11x53$	800	2^5x5^2	1054	$2x17x31$	1358	$2x7x97$
96	2^5x3	235	$5x47$	390	$2x3x5x13$	584	2^3x73	801	3^2x89	1064	2^3x7x19	1363	$29x47$
98	$2x7^2$	236	2^2x59	391	$17x23$	585	3^2x5x13	803	$11x73$	1065	$3x5x71$	1364	$2^2x11x31$
99	3^2x11	237	$3x79$	392	2^3x7^2	588	2^2x3x7^2	804	2^2x3x67	1066	$2x13x41$	1365	$3x5x7x13$
100	2^2x5^2	238	$2x7x17$	395	$5x79$	589	$19x31$	805	$5x7x23$	1067	$11x97$	1368	2^3x3^2x19
104	2^3x13	242	$2x11^2$	396	2^2x3^2x11	590	$2x5x59$	806	$2x13x31$	1068	2^2x3x89	1369	37^2
105	$3x5x7$	243	3^5	399	$3x7x19$	594	$2x3^3x11$	816	2^4x3x17	1071	3^2x7x17	1375	5^3x11
106	$2x53$	244	2^2x61	400	2^4x5^2	595	$5x7x17$	817	$19x43$	1072	2^4x67	1376	2^5x43
110	$2x5x11$	245	$5x7^2$	402	$2x3x67$	602	$2x7x43$	819	3^2x7x13	1073	$29x37$	1377	3^4x17
111	$3x37$	246	$2x3x41$	403	$13x31$	603	3^2x67	820	2^2x5x41	1078	$2x7^2x11$	1378	$2x13x53$
112	2^4x7	247	$13x19$	405	3^4x5	608	2^5x19	825	$3x5^2x11$	1079	$13x83$	1386	$2x3^2x7x11$
114	$2x3x19$	248	2^3x31	406	$2x7x29$	609	$3x7x29$	826	$2x7x59$	1080	2^3x3^3x5	1387	$19x73$
115	$5x23$	249	$3x83$	407	$11x37$	610	$2x5x61$	832	2^6x13	1081	$23x47$	1394	$2x17x41$
116	2^2x29	250	$2x5^3$	408	2^3x3x17	611	$13x47$	833	7^2x17	1088	2^6x17	1395	3^2x5x31
117	3^2x13	252	2^2x3^2x7	413	$7x59$	612	2^2x3^2x17	836	$2^2x11x19$	1089	3^2x11^2	1403	$23x61$
118	$2x59$	253	$11x23$	414	$2x3^2x23$	615	$3x5x41$	837	3^3x31	1104	2^4x3x23	1404	2^2x3^3x13
119	$7x17$	255	$3x5x17$	415	$5x83$	616	2^3x7x11	840	$2^3x3x5x7$	1105	$5x13x17$	1406	$2x19x37$
120	2^3x3x5	256	2^8	416	2^5x13	620	2^2x5x31	841	29^2	1106	$2x7x79$	1407	$3x7x67$
121	11^2	258	$2x3x43$	423	3^2x47	621	3^3x23	845	$5x13^2$	1107	3^3x41	1408	2^7x11
122	$2x61$	259	$7x37$	424	2^3x53	623	$7x89$	846	$2x3^2x47$	1120	2^5x5x7	1410	$2x3x5x47$
123	$3x41$	260	2^2x5x13	425	5^2x17	624	2^4x3x13	847	$7x11^2$	1121	$19x59$	1411	$17x83$
124	2^2x31	261	3^2x29	426	$2x3x71$	625	5^4	848	2^4x53	1122	$2x3x11x17$	1419	$3x11x43$
125	5^3	264	2^3x3x11	427	$7x61$	629	$17x37$	850	$2x5^2x17$	1127	7^2x23	1420	2^2x5x71
126	$2x3^2x7$	265	$5x53$	429	$3x11x13$	630	$2x3^2x5x7$	851	$23x37$	1128	2^3x3x47	1421	7^2x29
128	2^7	266	$2x7x19$	430	$2x5x43$	636	2^2x3x53	852	2^2x3x71	1139	$17x67$	1422	$2x3^2x79$
129	$3x43$	267	$3x89$	434	$2x7x31$	637	7^2x13	854	$2x7x61$	1140	$2^2x3x5x19$	1424	2^4x89
130	$2x5x13$	268	2^2x67	435	$3x5x29$	638	$2x11x29$	855	3^2x5x19	1147	$31x37$	1425	$3x5^2x19$
132	2^2x3x11	272	2^4x17	437	$19x23$	639	3^2x71	860	2^2x5x43	1148	2^2x7x41	1426	$2x23x31$
133	$7x19$	273	$3x7x13$	438	$2x3x73$	640	2^7x5	861	$3x7x41$	1155	$3x5x7x11$	1430	$2x5x11x13$
134	$2x67$	275	5^2x11	440	2^3x5x11	644	2^2x7x23	867	$3x17^2$	1156	2^2x17^2	1431	3^3x53
135	3^3x5	276	2^2x3x23	441	3^2x7^2	645	$3x5x43$	868	2^2x7x31	1157	$13x89$	1443	$3x13x37$
136	2^3x17	279	3^2x31	442	$2x13x17$	646	$2x17x19$	869	$11x79$	1159	$19x61$	1444	2^2x19^2
140	2^2x5x7	280	2^3x5x7	444	2^2x3x37	648	2^3x3^4	870	$2x3x5x29$	1160	2^3x5x29	1445	$5x17^2$
141	$3x47$	284	2^2x71	445	$5x89$	649	$11x59$	871	$13x67$	1161	3^3x43	1449	3^2x7x23
142	$2x71$	285	$3x5x19$	450	$2x3^2x5^2$	650	$2x5^2x31$	873	3^2x97	1162	$2x7x83$	1450	$2x5^2x29$
143	$11x13$	286	$2x11x13$	451	$11x41$	651	$3x7x31$	874	$2x19x23$	1175	5^2x47	1455	$3x5x97$
144	2^4x3^2	287	$7x41$	455	$5x7x13$	656	2^4x41	875	5^3x7	1176	2^3x3x7^2	1456	2^4x7x13
145	$5x29$	288	2^5x3^2	456	2^3x3x19	657	3^2x73	876	2^2x3x73	1183	$7x13^2$	1457	$31x47$
146	$2x73$	289	17^2	459	3^3x17	658	$2x7x47$	884	$2^2x13x17$	1184	2^5x37	1458	$2x3^6$

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Safer Than Home

NO LONGER can the public press picture industry as an ogre with bloody hands. Industrial safety has advanced to such a state that it is far less hazardous to work in a well managed factory than to remain home or roam the streets.

In a recent address Charles L. "Dad" Rice, Vice-President in charge of the Hawthorne Works of the Western Electric Company, said that, since 1925, accidents in that plant had been reduced 92 per cent. During 1930, with an average of thirty thousand employees, there were only 135 lost-time accidents, with one death—that one resulting from infection. In the month of November, all past records were broken with a total of five accidents, which represented the remarkable figure of 1.11 accidents per million hours of exposure. None could be attributed to machinery; all were caused by slipping, falling, scalding, falling objects, or infection. Outside the plant these employees had 504 accidents, and 13 deaths.

"Discipline is the crux of the safety situation," says Mr. Rice. In that word discipline is implied managerial responsibility, indicating that while safety thinking is a matter of the state of the mind of the individual, safety education and enforcement are up to management. Unfortunately that guiding hand cannot be extended beyond the confines of the plant, but Western Electric's enviable record gives other metal-working shops something tangible to shoot at. When industry as a whole has measured up to this high standard, it can well extend its influence into everyday life.

Another Vicious Circle

ONE of the unfortunate results of keeping an obsolete machine at work, or in shape to work when called upon, is that other obsolete machines are retained in other shops. Suppose, for instance, that the Jones Company keeps a gear cutter of obsolete type to cut repair gears for one of its own old machines that is occasionally used by the Smith Company. The Smith Company keeps this old machine for the purpose of machining parts for an obsolete motor used by the Brown Company to run an old machine which is kept on the floor to supply repair parts for the obsolete gear cutter owned by the Jones Company. As long as one of the three declines to replace his old machine the other two have to keep their old machines. If some one of them would pluck up courage and break the circle by throwing out his obsolete equipment, the chances are that the other two would follow suit.

Free Interchange

GOOD TIMES and bad, X Automobile Company maintains a competent economics research staff. The staff follows the trends of the raw materials markets. When pig iron prices appear to be right it passes the word along to the purchasing executives, and pig iron is bought. It gages the underlying economic conditions of its sales field, calculates potential buying power, proposes schedules for the coming quarter—sometimes for a full year ahead; the sales and production department adopt the schedules. Guesswork, perhaps; but guesswork that is right ninety-five per cent of the time.

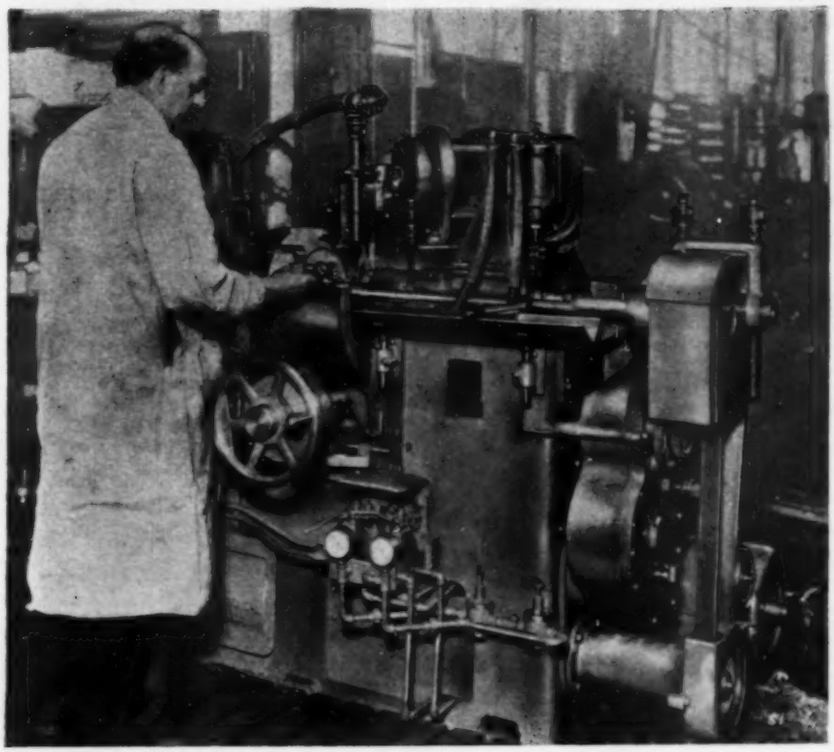
Y Agricultural Implement Company maintains a similar economics research staff—so too the Z Electrical Company. And the suppliers of the X, Y, and Z companies would give their right eyes to have access to their figures.

Why, in all good conscience, is such not possible? If the X company's production schedule for the coming year is going to call for new tooling, why should not the Q Machine Tool Builder be apprised of it? Why should he not be able to gage his own production by something more definite than his own wistful guesses. Why shouldn't the S Foundry and Machine Shop know that such and such would be the probable castings requirement of the Y company? It, too, could then take advantage of the right time to buy pig iron.

In other words, there seems to be a clear case for the free interchange of future plans and the statistics that back them up. What are the valid objections, if any?

SHOP EQUIPMENT NEWS

Arter Automatic Angle Wheelhead Shoulder Grinder



SHOULDERS, including fillets, can be ground on such parts as steering sectors and differential pinions by means of the Arter automatic angle wheelhead shoulder grinder. Although the machine is built somewhat on the lines of the No. 132 automatic cylindrical grinder, it is a distinct type of machine. Similarity does exist, however, in that the manner of handling the work is the same; that is, the operator loads the work into a turret, and the turret indexes the piece to the grinding position. Two live centers pick up and drive the work, clearance being provided in the hole in the turret and the front of the turret so that the wheel makes contact. The wheelhead unit has two slides, one moving toward the work and the other moving parallel with the work spindles. The forward slide is mechanically operated by cam control, whereas the cross-slide is hydraulically operated and has a dash-pot control. Grinding is done with a combined movement, one movement feeding the wheel into the work and the other moving the wheel across the work surface. Both movements are controlled and a positive stop is provided for each, so that the wheel dwells for a determined period at the end of each grind. After the grinding operation, the centers withdraw and the work is carried by the turret to a station where it is ejected automatically. The machine is built by the Arter Grinding Machine Company, Worcester, Mass.

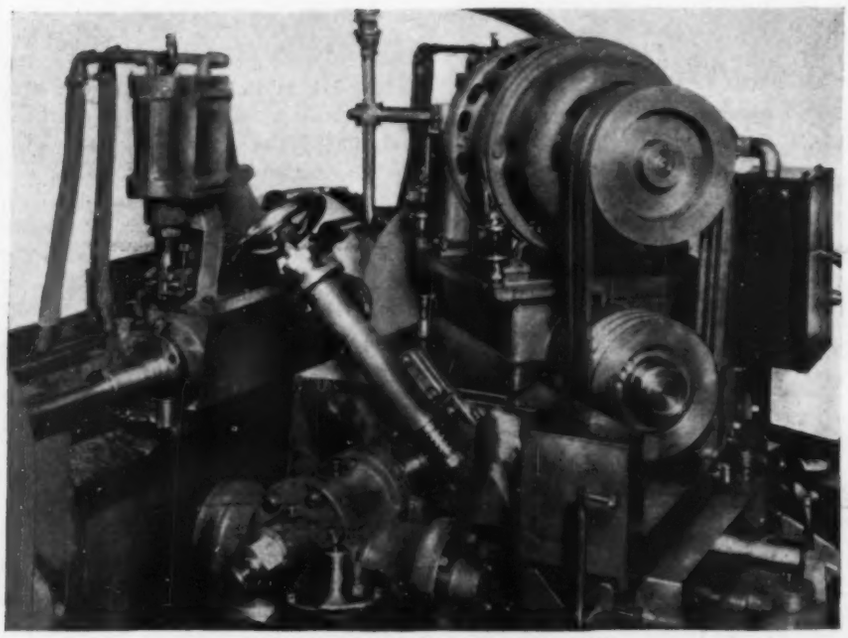
The wheel spindle is positioned at an angle of 45 deg. with the work spindles. Grinding is done with the periphery of the wheel, but it is so dressed that the cutting face is parallel with the shoulder on the work. The wheel spindle is mounted on ball bearings, and the drive is from a constant-speed motor, mounted on the wheelhead, through three V-belts. Handwheels compensate for wheel wear and are provided on each slide. Thus, the relation of the wheel to the work can be adjusted or maintained without necessity of disturbing the automatic movement of the slide.

On the top slide is mounted a wheel dressing attachment consisting of two slides, each provided with handwheels. These dials read in thousandths, and by observing the reading, the amount of wheel reduction can be compensated for by adjusting the handwheels on the wheelhead slides.

Synchronous movements of the head and tailstock spindles, wheel forward slide, wheel longitudinal slide, work turret index, and work ejector are controlled by cams. Both cams controlling the wheel slides are split for quick removal, as necessitated in some cases by changes in the work and to get maximum efficiency. The camshaft receives its drive from the secondary shaft through a conical friction clutch and reduction gears.

One turret is provided, the number of holes being as great as the diameter of work will permit. Indexing is made through a Geneva movement, so that the grinding wheel is almost constantly in action. The turret is split to permit quick changing. Sufficient clearance is provided in the holes so that the work can revolve freely while on centers.

Both the head and tailstocks are clamped by T-bolts to their seats, which are on an angle, and which form the upper portion of the machine base. Longitudinal movements of the spindles are made by air pressure, under cam control. The left-hand handle, just above the pressure gage, permits hand operation when necessary. The spindles are carried



On the Arter Automatic Angle Wheelhead Grinder a v-belt drive is employed for the wheel spindle, which is positioned at 45 deg. to the work spindles

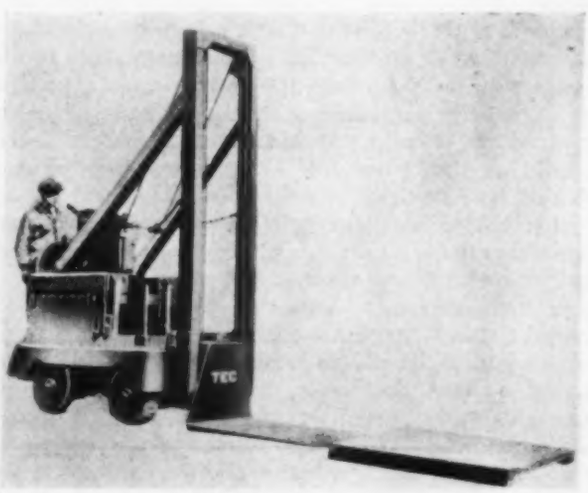
in adjustable bronze bearings, the end thrust being taken by ball bearings. They are driven by a full-floating pulley unit mounted in a fixed position at each end of the bed. This arrangement relieves the spindles of belt pressure and vibration from the driving means. Both spindles rotate in unison, the drive being by 1¾-in. belt from a secondary shaft. The secondary shaft is belt driven from the grinder main shaft over five-step cone pulleys.

In general, the machine is self-contained, being designed for indirect motor drive by belt or by direct motor drive through a flexible coupling. The tank, 55 gal. in capacity, is located on the floor at the rear. The pump is of the submerged centrifugal type. All pulleys and shafts assemblies are balanced, the main shaft, secondary shaft, and wheel spindle running on ball bearings.

"Tec" Model B Elevating Truck

A four-wheel-drive, skid-handling truck has been added to the line manufactured by the Terminal Engineering Company, 17 Battery Place, New York, N. Y. This machine is small enough to work in box cars, yet carries loads of 3,000 lb. in an overhung position. The height of the skid used with this truck need only be 2 in. below the platform. The truck travels at 10 m.p.h. empty, and at 7 to 9 m.p.h. with a 1½-ton load. The elevating speed varies from 25 to 40 ft. per min., but may be increased to 60 ft. per min. with a high-speed hoist motor of special design. Loads are all carried in an overhung position to enable tiering skids without the aid of a helper.

The truck is operated from a storage battery. Safety devices include an automatic stop on the up-stroke of the table; two independent sets of brakes; and controls located within the outer edges of the truck.



"Tec" Model B Elevating Truck, which weighs 7,500 lb.

Daun-Walter Constant-Level Oil Control

Regulation of the lubrication of machine bearings and ways can be accomplished by the constant-level oil control announced by the Daun-Walter Company, 334 East Water St., Milwaukee, Wis. The device consists of a main reservoir with gage to show the height of oil in the reservoir, a supporting bracket, a threaded

Capacities of Daun-Walter Oil Control range from ½ pt. to 2 gal.

lower extension for the oil lead connection, and a filling cap on the top. Through the influence of gravity and atmospheric pressure, oil is supplied to the bearing when and as it is used. The delivery of oil is automatic and is constantly controlled without the use of floats or other means and the correct oil levels are easily and permanently maintained by adjustment on the attaching bracket. The oil can be piped to feed one or several bearings on the same level, or in connection with a special adjustable wick unit, single or multiple bearings on different levels can be fed.

Wicaco Internal Precision Grinder

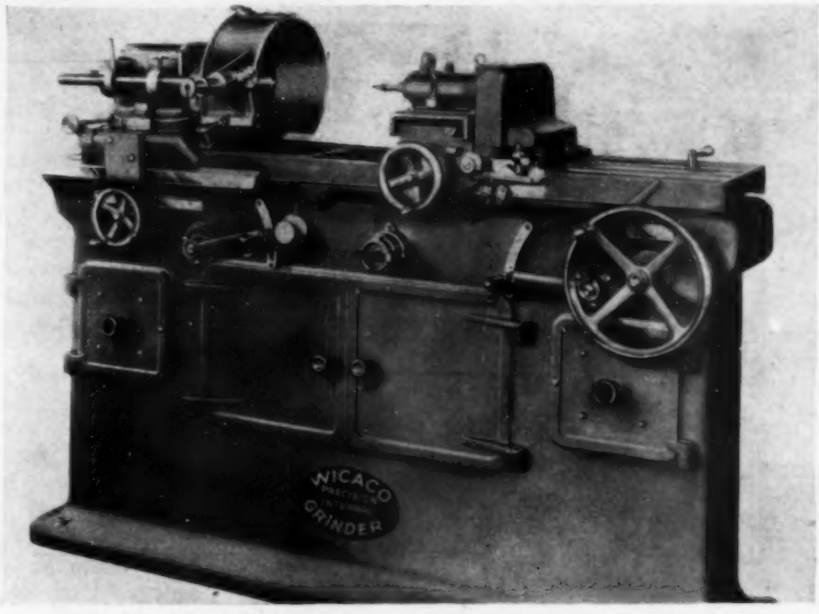
Capacity to swing 12 in. inside the waterguard and to grind 10 in. in depth is embodied in the internal precision grinder announced by The Wicaco Machine Corporation, Wayne Junction, Philadelphia, Pa. To minimize vibration, the wheel drive motor is hung under the center of the carriage, so that the ways rather than the heads absorb the torque. All drives have a constant-tension device and are self adjusting. Two oversize, widely spaced bearings with positive adjustment support the spindle, which is ground to receive any standard taper and threaded for all standard chucks. Spindle control is made through the lever at the left, while a rheostat on the variable-speed motor provides 16 speeds for the work.

The water-jacketed wheelhead is another feature of the machine, the oil chamber and bearings being surrounded by a cooling jacket, through which the ordinary grinding coolant is pumped continuously. This prevents appreciable rise in bearing temperature, maintains the lubricant at the desired viscosity, and eliminates chatter by holding down bearing wear. Adjustable end-float makes grinding to shoulders easy and safe. The wheelhead is mounted on the upper of two cross-slides. The upper slide provides both automatic and hand cross feed, while the lower is designed to permit quick setting for taper, or a step-over where two or more diameters are required. The wheel feed is automatic at end of the carriage travel, or can be made to feed straight into the work without carriage travel. The automatic feed can be raised by 0.0002-in. steps, from zero to 0.001-in. per stroke.

A variable-speed motor drives the carriage and with a rheostat control provides for 16 speed variations, and will traverse on 0.001-in. movement. It has an automatic reversing device for the traverse movement. Should an obstruction come between a fixed part of the machine and the moving carriage or its wheel, the carriage will reverse automatically without damage to the machine or alteration of adjustments. This is of value in the grinding of blind holes or shoulder work.

All revolving parts are corrected for dynamic balance. The diamond wheel-truing device is easy to adjust and operate, and its disengaging lever keeps it clear of the work and quill at all times. Both the pump and tank are integral and are mounted on the back face of the bed. Full operating floor space is 78x29 in., and the weight of the machine is 2,400 lb. Standard equipment consists of motors, one grinding wheelhead, wheel-truing device, pump, tanks.

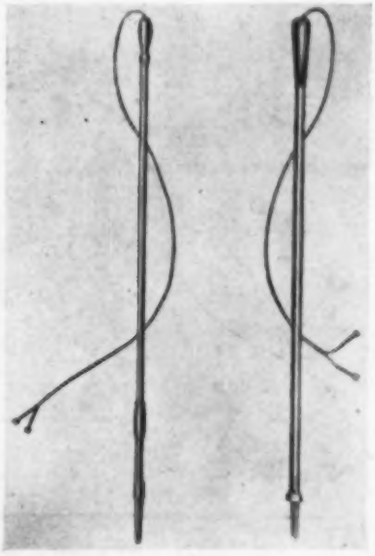
Specifications: Swing inside waterguard, 12 in.; depth of hole ground, 10 in.; length of base, 70⅜ in., width 18 in.; work center from floor, 45 in.; hole in spindle, 1⅝ in., workhead graduated to 15 deg.; traverse speeds, 20 to 60 in. per min. in 16 steps.



Reduced vibration and minimized chatter are obtained for the wheelhead of the Wicaco Precision Internal Grinder by mounting the motor below it

Brown Molten-Metal Thermocouples

To measure temperatures below the surface of molten metals and to indicate the temperatures within a few seconds are the requirements met in the thermocouples announced by the Brown Instrument Company, Philadelphia, Pa. The type for brass and bronze consists of a sensitive thermocouple mounted in a replaceable protecting tip made of a special alloy. The tip is joined to a hollow handle, through which wires in the thermocouple connect with the Brown portable pyrometer. The large 5-in. scale on the pyrometer instrument makes it easy for the operator to read the temperature quickly and correctly. In this equipment, accurate readings



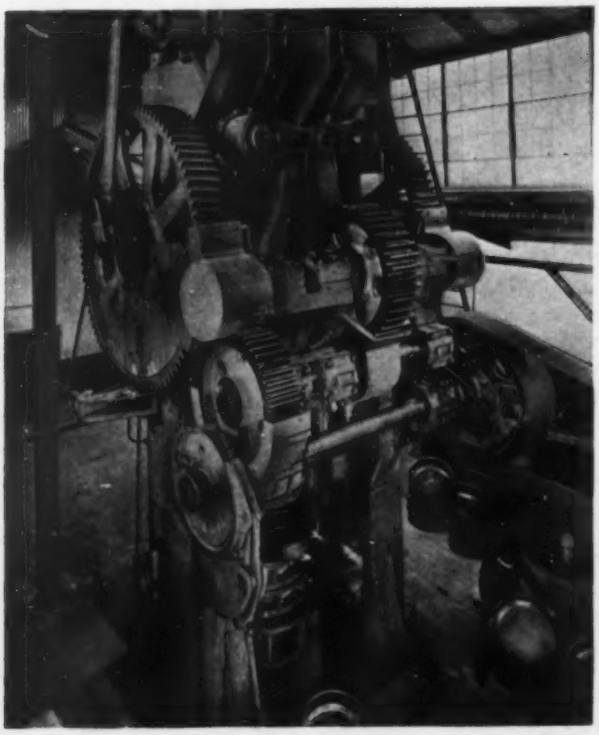
Brown Molten-Metal Thermocouples. Left—for bronze or brass. Right—for aluminum

will be obtained in approximately 25 seconds. Tests have shown that the tip will average 500 to 600 immersions of 30 seconds each in yellow or red brass at 2,250 deg. F.

For molten aluminum, bare thermocouple wires project beyond a replaceable tip, which serves to electrically insulate the two thermocouple wires to prevent obtaining the temperature at the surface of the metal. The molten aluminum thermocouple will give the correct temperature readings within 4 sec. As the portion of thermocouple wire projecting from the tip is consumed, the operator feeds new wire to the tip by simply sliding forward the button midway up the tube. A supply of wire is contained in the handle sufficient for several hundred immersions.

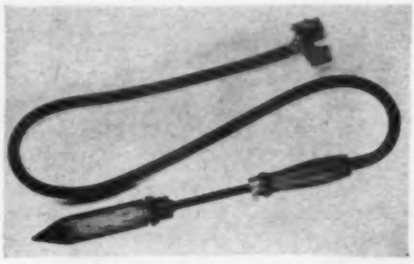
Toledo 1,200-Ton Deep-Drawing Press

For drawing 40-qt. milk cans out of Allegheny metal, the Toledo Machine & Tool Co., Toledo, Ohio, has built a deep-drawing press with a rated capacity of 1,200 tons at the bottom of the stroke. The stroke is 45 in., and the machine is 35 ft. high, 17 ft. 8 in. wide, and weighs 220 tons. The two large gears at the top of the press are 10 ft. in diameter and weigh 10 tons each. In 10-gage Allegheny metal, the press can draw a round container as large as 24 in., using a blank of 68 in. Using the same alloy in 14 gage, the press can draw a rectangular shape as large as 50x40 in. by 16 in. deep.



"Torchiron" Gas-Heated Soldering Iron

Low gas consumption is the feature of the "Torchiron" soldering iron announced by the Reliance Specialties Manufacturing Company, 122 East 42nd St., New York, N. Y. For example, with a 3-lb. tip the gas consumed is between 6 and 7 cu.ft. per hr., and with a 5-lb. tip between 8 and 9 cu.ft. per hr. Low-pressure air and either natural or artificial gas are used, they being sensitively controlled by the mixing needle valve.



"Torchiron" Gas-Heated Soldering Iron, available with from ½- to 5-lb. standard and special coppers

By indirect heating of the copper tip, filing, cleaning, and retinning of the copper tip are minimized. The heat of the tip can be kept constant or changed by adjustment of the needle valve. Copper tips can be changed quickly, being merely screwed onto the stainless steel tip. The tool is being made in sizes to take from ½- to 5-lb. coppers, and special coppers can be furnished. An integral part of the "Torchiron" is the deflector.

Federal Model 165 Cylinder Test Gage

Quick and accurate measuring of small holes either while the parts are in the grinding machine, screw machine or lathe or on the bench can be done with the Model 165 cylinder test gage announced by the Federal Products Corporation, Providence, R. I. For the bench work, the tool can be permanently mounted with an attachment. It is suitable for measuring inside diameters from ¼ to 1½ in., the dial indicator being graduated to 0.0001 in. Gaging plugs can be changed in less than 30 sec., the range of each plug being plus and minus 0.010 in. Standard lengths of the gaging plugs are ¼ to ⅜ in.—2¾ in.; ⅜ to ⅝—3¾ in.; ⅝ to 1½—5¼ in. Special length gaging plugs can be furnished.

"Prest-O-Weld" Type W-107 Aircraft Welding Blowpipe

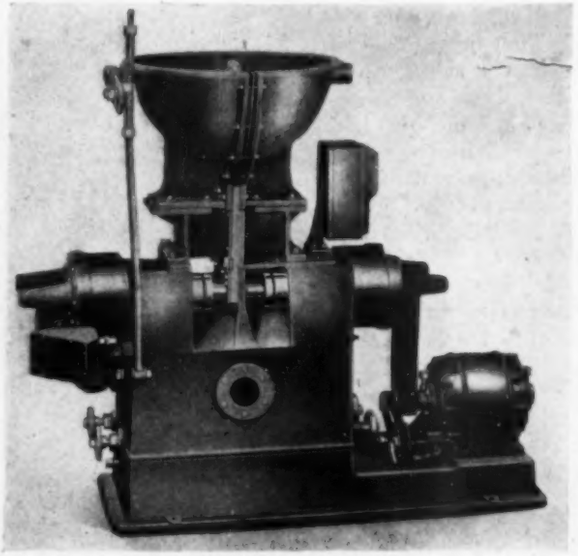
Although the type W-107 welding blowpipe, announced by The Linde Air Products Company, 30 East 42nd St., New York, N. Y., has been designed primarily for airplane fuselage welding, it is suitable for light welding work of all kinds. In design and appearance, it is somewhat similar to the Oxweld Type W-15 blowpipe, but operates on the medium-pressure principle. The gases mix immediately in front of the handle, and the oxygen and acetylene valves are so located that they can be readily adjusted with the thumb and forefinger of the hand that operates the blowpipe. The blowpipe is 10½ in.

in length, weighs 10 oz., and is balanced. Six tips are available for use with this tool, although it is furnished as standard with 5 tips, Nos. 2 to 6 inclusive. The "Prest-O-Weld" Type W-107 welding outfit includes the blowpipe and the Type R-106 oxygen regulator, Type R-107 acetylene regulator, two 25-ft. lengths of $\frac{3}{16}$-in. hose, 1 pair of fibre spectacles, hose clamps, and an instruction book.

Kent 1-Inch Duplex Countersinking Machine

Both ends of the hole in nuts from $\frac{1}{2}$ to 1 in. are countersunk automatically on a duplex machine announced for the purpose by the Kent Machine Company, Cuyahoga Falls, Ohio. The principle of operation of this machine is identical with that of the smaller model manufactured for some time, but the design varies materially. This countersinker is of the duplex type with one hopper feeding both sets of countersinking spindles. Provision is made for adjustment of stock to give the desired depth of countersink, irrespective of the thickness of the nut. This secures the same amount of countersinking on every nut, and minimizes troublesome delays in production.

The nut is fed from the hopper through the magazine chute to a formed receptacle, in which it is held and where the countersinking operation takes place. After the operation has been accomplished, the nut is automatically ejected from the holding receptacle and a new nut fed into place. The spindles and working parts are controlled by one camshaft, located between the countersinking spindles and in the center of the machine. Forced-feed lubrication insures oiling of all bearings and working parts. Changes to accommodate different sizes of nuts within the capacity of the unit are made quickly. Each set of countersinking spindles makes 60 reciprocations per minute, giving a possible production of 7,200 nuts per hour. The machine is furnished in the motor-driven model with a 1-hp., 1,800 r.p.m. motor operating through a belt drive to the center camshaft of the machine. Countersinking spindles are driven direct from the shaft, as shown in the illustration below.



General Electric 100-Watt Floodlight

A 100-watt, general-utility floodlight projector, the "Novalux" Handy Floodlight, has been announced by the General Electric Company, Schenectady, N. Y. The projector, weighing less than 3 lb. and measuring less than 9 in. wide, 10 in. deep and 13 in. high with supporting stand, is built for a 100-watt, inside-frosted, general-service incandescent lamp. The unit is composed of a sheet-aluminum combination casing and reflector. The casing is polished inside, forming the specular surface for reflecting purposes. The front lens, 8 in. in diameter and of heat-resisting, clear, convex glass, is clamped against a gasket fitting. Vertical and horizontal adjustments are obtained with wing nuts in the swivel support and base. It is finished in green baking enamel and chromium plate.

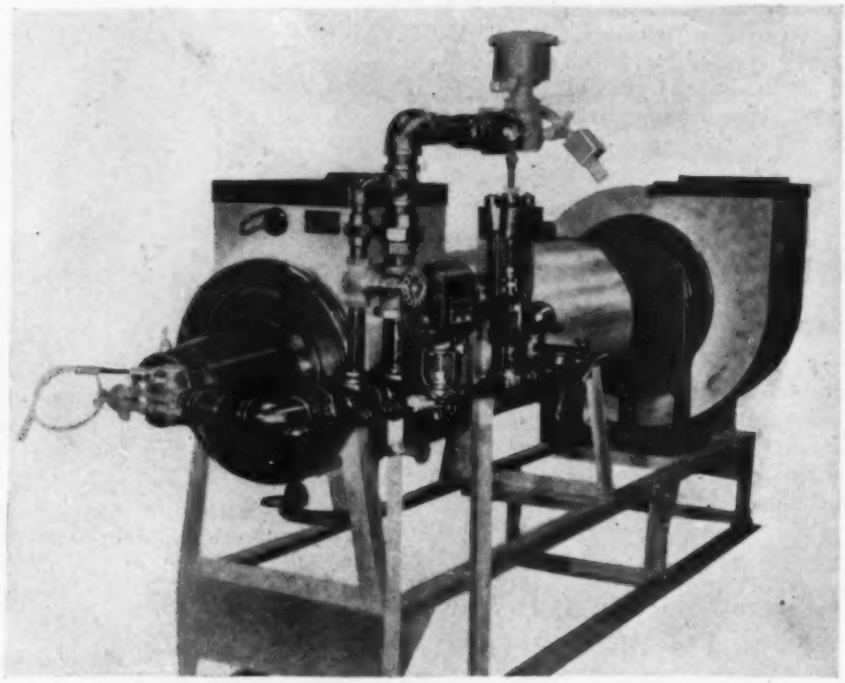
General Electric "Novalux" Handy 100-Watt Floodlight for portable use on operations where extra illumination is required

"Korodless" Chrome-Nickel-Steel Wire Rope

Preformed construction is used for the "Korodless" wire rope announced by the Hazard Wire Rope Company, Wilkes-Barre, Pa. Material used for this rope is Nirosta austenitic chrome nickel alloy steel and therefore is highly resistant to corrosion. It withstands temperatures up to 1,650 deg. F. Preforming the strands and wires in helical shape minimizes internal stress and allows the individual wires to lie side by side without undue internal friction.

Maehler Oil-Fired Industrial Oven Heater

For recirculation of oven air and incineration of inflammable and explosive vapors, The Paul Maehler Company, 2208 West Lake St., Chicago, Ill., is announcing an oil-fired industrial oven heater similar to the gas fired universal heater described on page 416, Vol. 73, of *American Machinist*. The oil-fired universal heater operates much the same as the gas-fired model, the heated air from the heating chamber being forced by



Maehler Oil-Fired Industrial Oven Heater for recirculation and maintenance of temperature of the oven atmosphere together with incineration of explosive vapors given off from finishing materials

the blower at the outlet end of the heater into the oven, creating a slight additional pressure, which distributes the heat evenly throughout the oven, providing uniform temperature at all points. Recirculating air, drawn from the oven at a high temperature, is reheated and tempered with a controlled volume of fresh outside air. Thus, the heated air in the oven is not wasted, but is used over again and the heater is required only to raise the temperature a slight amount. Explosive vapors are drawn from the oven and incinerated in the heater instead of being allowed to collect in the oven.

The heater may be located at any desired point above, beside or below the oven, with the control apparatus in a convenient location. The all-bronze burner is provided with a self-flushing arrangement designed to provide correct combustion of fuel oil and deliver clean heat, while the heating chamber is constructed to prevent heat loss. Flame spreaders insure uniform heating of all circulating air passing through the heater and complete combustion of all inflammable vapors arising from the finishing materials.

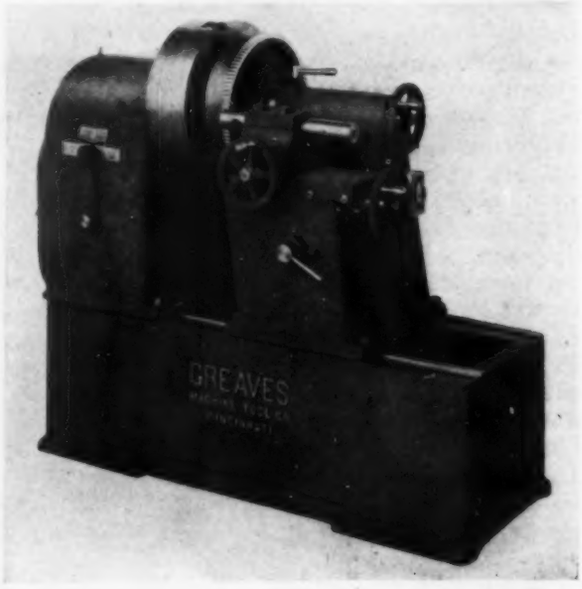
The remote control cabinet is equipped with a Bristol temperature controller to regulate the oil flow and may be set for any desired temperature over a wide range. A gas pilot is kept constantly burning and an electric match operates intermittently to relight the pilot in event it is extinguished. An oil scrubber is used in the feed lines. Protection against fire or explosion is provided by a series of safety devices, which shut off all valves in event of such a failure. Manual operation is necessary to start the heater again after such a shutdown. A special bypass around the controls maintains a low flame, however, when the temperature control closes.

The heated air is delivered at the top of the oven and withdrawn from the bottom. The oil-fired heater is available in five sizes with air delivery capacities from 3,000 to 12,000 cu.ft. per min., and B.t.u. deliveries from 450,000 to 3,000,000.

Greaves Brake Drum and Flywheel Lathe

Wheels up to 42 in. in diameter may be swung on the brake drum and flywheel lathe announced by The Greaves Machine Tool Company, Cincinnati, Ohio. For example, a dual-tired truck wheel such as used on trucks and buses, complete with pneumatic tires, can be mounted upon a proper arbor and then placed between the centers of the machine, the distance between centers being 24 in. Flywheels to be turned down are chucked the same as in a standard lathe, the universal chuck taking all sizes of flywheels and being self-centering. The lathe can also be used for turning of commutators, the truing of differential housings, rough turning of pistons, and truing of wheel flanges.

As shown in the accompanying setup, after the flywheel is chucked, the tailstock spindle cone center is forced into the flywheel, thereby supporting it at both ends. This minimizes the possibility of the flywheel working away from the chuck jaws or flying out of the chuck. The flywheel is then turned, using the micrometer cross feed for setting the tool to obtain the proper diameter. Features of the machine are an internal gear drive on the main spindle; all geared throughout; Timken bearings for main spindle; shifter lever control of speeds and feeds; built-in motors; Alemite lubrication; no pick-off gears; chuck remains on spindle for all



Greaves Brake Drum and Flywheel Lathe that swings 42 in.

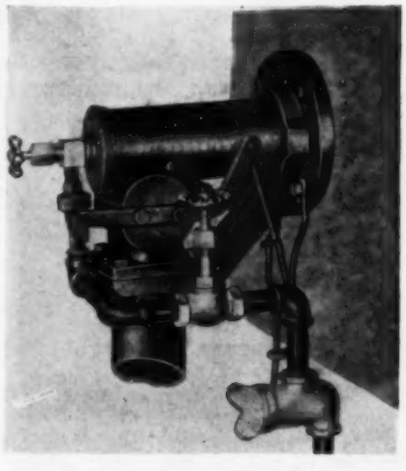
operations; hollow spindle for turning shafts; and rigid support at both ends of mandrel in truing brake drums. Regular equipment includes two taper arbors and one adapter arbor with eight adapters.

Other specifications of the machine are: Hole through spindle, 1½ in.; height, floor to spindle center, 36-in.; spindle speeds, 16-31-56 r.p.m.; feeds, 0.0125 and 0.025 per rev.; length of travel, longitudinal slide, 8 in.; chuck, 17 in. 3-jaw, universal; motor, ¾ hp.; floor space, 19x60 in., and weight crated, 1,570 lb.

Naudain Rapid-Heating Oil Burner

For heating, welding, forging, and melting furnaces, the Naudain Manufacturing Company, 1001 Rectory Lane, Baltimore, Md., is announcing a fuel-oil burner designed to operate on 10 to 14 oz. air pressure. With slight alterations of the inner tube, the burner can be used on low-pressure air by using high-pressure air for atomizing, or low-pressure air and steam for atomizing.

The burner body is machined for the reversible air valve, the adjusting cone bushing, and the removable

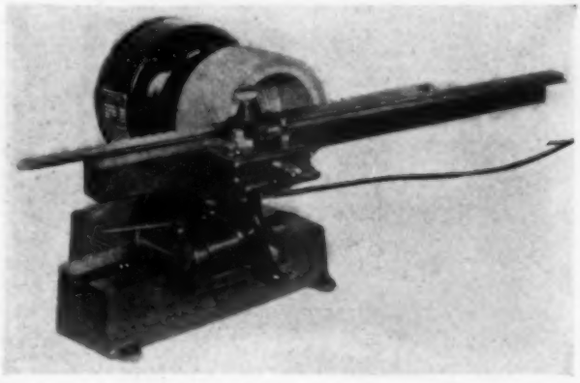


inner tube, in which there is screwed the needle valve, the oil tube, the mixer and the atomizer cap. The body is mounted on a bracket, which permits the burner to be removed without dismantling the large air pipe. It also contains the heat protecting plate, which is opened automatically and closed by the air-valve handle, and which protects the burner from the intense heat while inactive.

The air is thoroughly mixed with oil and passes through a conical bushing, which regulates the amount of mixture required. The burner is self-cleaning, does not carbonize, and combustion takes place directly after the mixture leaves the burner.

"Wells" No. 110 Grinder for Keyseaters

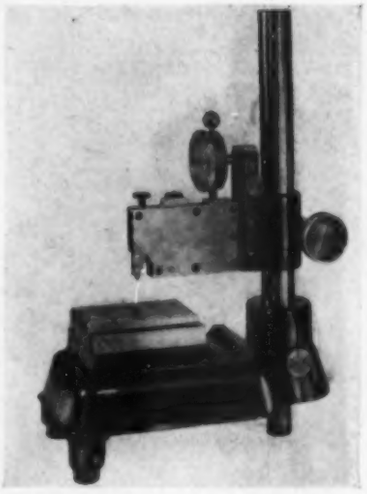
For sharpening the face of the tooth and giving any desired undercut, the No. 110 grinder for keyseaters has been placed on the market by the Wells Manufacturing Company, P. O. Box 613, Greenfield, Mass. The tool grinds the cutting edge similar to a chip breaker, every other tooth having a different angle.



It is fed by hand with a spring to locate the tooth to be ground. Swing motions only are employed, there being no slides to incur wear. The grinder is equipped with a ¼-hp. motor.

"Precision" Amplifying Comparator

Capacity to measure to 14 in. above the surface plate or 8½ in. above the platen is embodied in the amplifying comparator announced by the Precision Gage & Tool Company, 320 East Third St., Dayton, Ohio. The anvil or platen is quickly adjustable to any desired position so that readings on odd-shaped work can be readily taken, and, of course, the comparator can be swung about the vertical post, which is 16-in. high. Special fixtures can be mounted in the place of the regular platen. In



"Precision" Amplifying Comparator which employs a weight to hold the spindle on the work with uniform pressure at all spindle positions

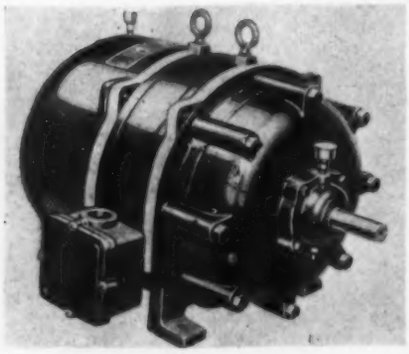
addition, the rear foot of the three rubber-tipped feet is made adjustable so that the entire assembly may be tilted backward, thus bringing the platen and the work to a more convenient angle for observation.

A close-coupled, two-piece movement or action is employed in this comparator, which has no bearings, pins, trunnions or springs. It is mounted on hardened knife edges and inclosed in a dust-proof case. The amplification ratio is 10 to 1 as standard equipment. Compensation for slight wear has been provided. The amplified movement is read by means of a dial indicator graduated to half ten-thousandths and having a range of 0.013 in.

The comparator is mounted on a strong, rugged base measuring 6x10 in. The ball point is about 3/16 in. in diameter and has a Stellite tip as standard equipment, but may be furnished with a diamond tip.

Howell Types EKCL and EKBB Motors

For Class 1, Group D, service, the Howell Electric Motors Company, Howell, Mich., has announced both polyphase and single phase motors



Howell Totally-Inclosed, Fan-Cooled Motor for Class 1, Group D Locations

with either totally inclosed frames or totally inclosed fan-cooled frames. The polyphase motors are of squirrel-cage construction with extra heavy castings. All machined parts have large fitting surfaces to correspond with the Underwriters' Laboratory requirements for this class of service. The single-phase motors are also of squirrel-cage construction, and are of the condenser-start type, each motor having a condenser starting unit placed in a separate box, which must be mounted outside the hazardous area.

PATENTS

February 24, 1931

Metal-Working Machinery

Lapping Machine. Wilson P. Hunt, Moline, Ill., assigned to Moline Tool Co. *Patent 1,793,486.*

Apparatus for Making Electric Cables. Gustave A. Johnson, Irvington, N. J. *Patent 1,793,487.*

Metal-Working Punching Machine. Albert W. Happel, Toledo, Ohio, assigned to Kent-Owens Machine Co. *Patent 1,793,611.*

Strip-Corrugating Machine. August D. Meiselbach, Chicago, Ill., assigned to William J. Sandberg. *Patent 1,793,-629.*

Tool-Controlling Mechanism. Carl J. Price, Cleveland, Ohio, assigned to Warner & Swasey Co. *Patent 1,793,-718.*

Tool-Feed Device for Crank-Pin-Turning Lathes. Frederick S. Floeter, Saginaw, Mich., assigned to Wickes Bros. *Patent 1,793,789.*

Forging Apparatus. Hermann Kuhlemeier and Jacob Gerhard, Niederschelden-Sieg, Germany, assigned to the Firm Vereinigte Stahlwerke Aktiengesellschaft, Dusseldorf, Germany. *Patent 1,793,938.*

Machine For Boring Metal. Herbert Joseph Longley, Twickenham, England, assigned to Automotive Engineering Co. Ltd., Twickenham, England. *Patent 1,794,080.*

Grinding Machine. Harry Hales Asbridge, Ashton-on-Mersey, England, assigned to The Churchill Machine Tool Co. Ltd., Broadheath, near Manchester, England. *Patent 1,794,271.*

Tools and Attachments

Reamer. Nelson L. Huff, Milford, Mass. *Patent 1,793,484.*

Tool Holder With Dovetail Lock. Ole Severson, Shelton, Conn., assigned to The O. K. Tool Co. *Patent 1,793,564.*

Process of Making Punches for Reflectors. William H. Wood, South Euclid, Ohio. *Patent 1,793,660.*

Method and Apparatus for Making Thread Chasers. Ernest A. Walker, Worcester, Mass., assigned to John Bath. *Patent 1,793,727.*

Press Cushion and Chucking Mechanism for Wheel Rims. Fredrich J. Rode, Chicago, Ill., assigned to Rudolph W. Glasner. *Patent 1,793,749.*

Tolerance Gage. Hilding Valdemar Turnebohm, Gottenborg, Sweden, assigned to Aktiebolaget Svenska Kullagerfabriken, Gottenborg, Sweden. *Patent 1,793,763.*

Apparatus for Forming Cast Rotors. Carl E. Johnson, Pasadena, Calif., assigned to Sterling Electric Motors, Inc. *Patent 1,793,854.*

Rotor Mold. Carl E. Johnson, Pasadena, Calif., assigned to Sterling Electric Motors, Inc. *Patent 1,793,855.*

Finishing and Polishing Tool. Charles Helling, Milwaukee, Wis. *Patent 1,794,015.*

Stand and Control Means for Electric Portable Drills. James G. Collins, Kalamazoo, Mich., assigned to Atlas Press Co. *Patent 1,794,149.*

Gear-Cutter Centering Gage. Edward G. Flamm, Philadelphia, *Patent 1,794,162.*

Optical Measuring Device. Malcolm K. Parkhurst, New York, N. Y., assigned to Brown & Sharpe Manufacturing Co. *Patent 1,794,341.*

Processes

Method of Manufacturing Nuts. Frederick Lackner, Pittsburgh, Pa., assigned to Neely Nut & Bolt Co. *Patent 1,793,939.*

Method of Making Nuts. George C. Easter, Baltimore, Md., assigned to The Vulcan Steel Products Co. *Patent 1,794,064.*

Apparatus for Coating Metal Sheets. Edmund W. Shinn and Robert H. Scott, Cumberland, Md. *Patent 1,794,093.*

Furnaces

Apparatus for Conveying Material Through Heat-Treating Furnaces. Leonard Larson, Massillon, Ohio, assigned to Republic Steel Corporation. *Patent 1,793,940.*

Heat-Treating Furnace. Frank T. Cope, Salem, Ohio, assigned to The Electric Furnace Co. *Patent 1,794,151.*

Electric Furnace and Electric Resistance Element Therefor. Herbert J. McCauley, Buffalo, N. Y. *Patent 1,794,310.*

TRADE PUBLICATIONS

COPPER WELDING. Murex Welding Processes Ltd., Ferry Lane Works, Forest Road, London, E.17, England, has published a booklet "Copper Welding by the 'Premag' Process," employing oxy-acetylene for welding copper of normal composition.

CORROSION- AND HEAT-RESISTANT ALLOYS. The American Society for Testing Metals, 1315 Spruce St., Philadelphia, Pa., has reprinted "Tables of Chemical Compositions, Physical and Mechanical Properties, and Corrosion-Resistant Properties of Corrosion-Resistant and Heat-Resistant Alloys," available in a special binder at $1.50.

FIBRE. The National Electrical Manufacturers Association, 420 Lexington Ave., New York, N. Y., Vulcanized Fibre Section, has revised the standards for dimensions, tolerances and specifications for vulcanized fibre, sheets, tubes, rods and rolls. Copies of the new standard are available at $0.25 each.

FIBRE. The Continental Diamond Fibre Co., Newark, Del., is distributing a comprehensive catalog on vulcanized fibre, discussing the manufacture, machining, applications, and giving specifications and useful tables.

FUSIBLE ALLOYS. The U. S. Department of Commerce, Bureau of Standards, has issued Research Paper 248 entitled "Properties of Lead-Bismuth, Lead-Tin, Type Metal and Fusible Alloys," for sale by the Superintendent of Documents, Washington, D. C., for $0.10.

TESTING LABORATORY SERVICE. The Pittsburgh Testing Laboratory, Pittsburgh, Pa., has issued a brochure entitled "Fifty Years of Service to Industry," describing its service, which falls within four basic divisions—chemical, physical, inspection, and research, and showing some of the equipment employed and projects on which service has been rendered.

"STEWART MELTING POT." The Chicago Flexible Shaft Co., Roosevelt Road & Central Ave., Chicago, Ill., has published the *"Stewart Melting Pot"* for February, giving material on heat-treating definitions, carburizing, cyanide hardening, and other subjects, and showing equipment.

A PLATFORM FOR AMERICAN BUSINESS

AN ENTERPRISING numerologist releases the welcome news that the world cannot have another depression until the year 2029. With tongue in cheek and fingers crossed he assures us that the digits of each recent lean year total thirteen: $1 + 9 + 3 + 0 = 13$; $1 + 9 + 2 + 1 = 13$; $1 + 9 + 1 + 2 = 13$. No thirteens for ninety-nine years—no depressions. It is all very simple.

In the supplement to this issue of *American Machinist* will be found "A Platform for American Business," a sound, reasoned contribution to business philosophy plus a check sheet for carrying the philosophy into action. It is not as simple as the rule of thirteen. Its preparation has required the collaboration of scores of able men, both within and without the McGraw-Hill organizations. To carry it out may be arduous, but we see no alternative. It should not be lightly pigeonholed.

Briefly, the platform is composed of four planks. Though they may appear to be truisms, they are none the less basic. They are neither Coué formulas nor Voodoo incantations; a rabbit's foot may be just as effective in the recovery of business as the fatuous and parrotlike repetition of "business is fundamentally sound." As Secretary Klein quoted in a recent radio talk, "the easiest way to get to the top is to go to the bottom of things."

We commend the Platform for American Business to your earnest consideration, and action.

THE EDITORS

"Modernize," says the Platform. This photograph of the steel work of the new thirty-three story McGraw-Hill Building was taken from the offices of *American Machinist* on February 24, 1931, when 21 stories had been erected. Several new high-speed printing presses have been ordered for autumn installation

NEWS OF THE WEEK

New 19-ft. butterfly valve at Ruskin plant, British Columbia Power Corporation. Its total weight is 98 tons, the disk weighing 47. It is operated by 200-lb. oil pressure. When closed it is sealed by a rubber tube carrying water under pressure

Program for 3-M Congress Announced by A.S.M.E.

THE co-ordinated program of the Second National Industrial Congress, featuring management, maintenance, and materials handling, in Cleveland, April 13 to 17, offers wide variety in the field of manufacturing and management. The A.S.M.E., through its Management and Materials Handling Divisions, will contribute the major part of the program, with the American Management Association co-operating. The Cleveland Electrical Maintenance Engineers' Association will co-operate in the maintenance program. All sessions will be held in the Cleveland Auditorium. During the week, the Second National Industrial Equipment Exposition will also be held there.

The program of the Three-M Congress opens Monday afternoon with a session on the handling of ferrous scrap, under the auspices of the A.S.M.E. Elimination-of-Waste Committee. In the evening, the Committee will hold a session on the control of waste, and informal talks on waste-campaign experiences and suggested systems.

Tuesday morning opens with inspection trips to be followed that afternoon by a management session, discussing the machinery developments and planning of the Point Breeze (Md.) Western Electric plant. In the afternoon, there will also be the first materials handling session, covering hoist and monorail handling of materials. That evening, the Management Division will have a drafting department session and the Materials Handling Division will hold a standardization conference, while the S.I.E. will hold the first of its two evening sessions on marketing.

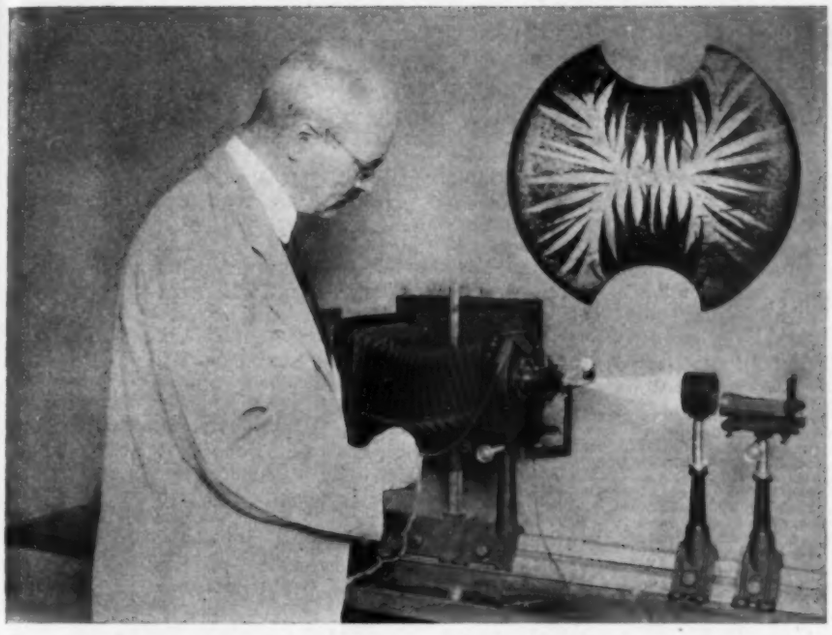
There will be several plant-inspection trips Wednesday morning. In the afternoon, the Materials Handling Division will hold simultaneous sessions on outdoor handling of materials, and handling of materials by conveyors. That evening a symposium on trucking and shipping, dealing with gas and electric trucks and skid platforms, and a session on the design of materials-handling equipment, will be held.

Thursday morning opens with a session on costs, wage incentives, and similar subjects. On the same morning, the Materials Handling Division will hold a session on the discussion of pneumatic handling and small packaging. The Thursday afternoon session will cover operation details, such as maintenance of tools and machinery and their inspection. At the same time, the Materials Handling Division will hold a general session, covering rubber products and counting devices for materials handling. That evening the dinner of the Three-M Congress, arranged by the Cleveland Engineering Society, will be held.

Friday, the last day of the Congress, will open with plant-inspection trips in the morning and technical sessions in the afternoon. The last maintenance session will be given over to problems on lighting, painting, and similar subjects. The last materials handling session will cover belt handling of bulk materials and the use of portable belt conveyors.

A. S. A. Releases Standard On Hose Coupling Threads

The proposed American Standard for Hose Coupling Screw Threads for all connections having nominal inside diameters of ½, ⅝, ¾, 1, 1¼, 1½, and 2 in. has been released for general criticism and comment. This proposal includes the form and pitch of the thread in addition to dimensional tables for hose couplings for steam, water, and air services (fine threads); and hose



Slightest deformation of a piece of metal under stress, as in rolling mill practice, is "seen" (upper right) by this instrument, invented by Dr. A. Nadai of the Westinghouse Research Laboratories

couplings for certain other applications. This proposed Standard was developed by the Sectional Committee on Standardardization of Screw Threads for Hose Couplings for which the A.S.M.E. is the sponsor body. Copies may be received for criticism and comment from C. B. LePage, Assistant Secretary, the A.S.M.E., 29 West 39th St., New York, N. Y.

The basic form of thread is the American National Standard, having an included angle of 60 deg. and truncated top and bottom. The most advantageous thread pitch for each nominal diameter has been determined and specified, and non-standard sizes were eliminated. Included in the standards are dimensions for garden hose, fire protection service, chemical hose, fire protection service other than chemical hose, couplings for steam, water, air and similar services, and special series.

Foundry Equipment Orders Up

According to the latest report of the Foundry Equipment Manufacturers Association, orders as reported by the members have shown some increase. The January index of gross orders is 65.3, as compared with 59.8 in December, thus bringing the 3-month average of gross orders to 56.8 for January, as compared with 51.7 for December. Shipments declined, however, from 102.6 in December to 54.69 in January, while the index of unfilled orders increased from 82.3 in December to 94.6 in January. The base for these calculations is the average monthly shipments for 1922-23-24 taken as 100.

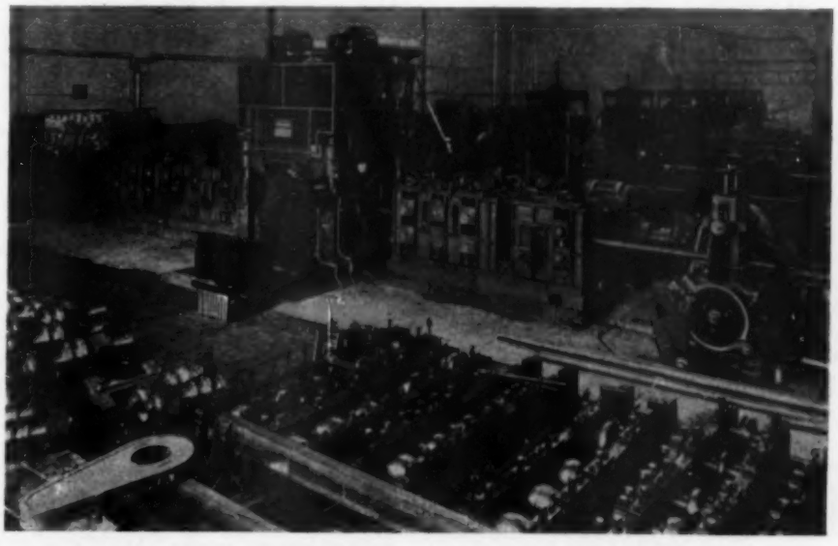
Robot Light Control For Machine Shop

O. H. Caldwell, Editor of *Electronics* and *Radio Retailing*, New York City, and formerly Federal Radio Commissioner, spoke on "The Use of Radio Tubes and Kindred Devices in the Control of Industrial Operations" before the Society of Industrial Engineers at Newark, N. J., Feb. 24. Among the tests reported by Mr. Caldwell were those of the lighting of a large machine shop, half controlled in the ordinary way by hand-operated switches and half by photo-cell switches which turn the lights on when it gets dark or cloudy on the outside. A year's test has shown that this automatic photo-cell lighting consumed only about one-half as much electricity during the year as was taken by the same number of lights switched on by the workmen but then left burning when not further needed. Records kept showed further that the automatic lights often came on at times when the hand-controlled lights were not lighted, because the foreman or attendant, busy elsewhere, did not operate the switches until the factory interior had fallen far below the allowable limit of illumination.

SHARP contrasts between the attitudes of government toward industry in two of the world's leading industrial nations, the United States and Germany, are revealed in a study of Germany's industrial system just completed and published by the National Industrial Conference Board under the title of "Rationalization of Germany Industry."

THE Insurance Division of the American Management Association will meet at the Palmer House in Chicago, April 27-29, according to an announcement by William J. Graham, President of the Association. The Insurance Division is headed by P. D. Betterley, Vice-President of the Association and Assistant Treasurer of the Graton & Knight Co., Worcester, Mass. All meetings during the three-day conference will be presided over by Harry Arthur Hopf, senior partner of H. A. Hopf & Co., New York City.

A FIRST National Exposition of Mechanical Handling is planned for the week of Nov. 30-Dec. 5 in Grand Central Palace, New York City. This Exposition will be handled by the International Exposition Co., Grand Central Palace, New York City, with Charles F. Roth as manager.



New electric tube welding unit at Steel & Tubes, Inc., able to weld 5-in. O.D. tubing with a wall thickness of ¼ in. directly from flat stock in rolls at a rate of 80 ft. per min. It uses 2,300 volts, 1,200 kw. at the electrode, and produces tubing with wall thickness tolerances of less than 0.004 to 0.008 in. plus or minus

Machinery and Tool Exports Show Upturn in January

PAUL WOOTON
Washington Correspondent

WASHINGTON, D. C., Feb. 28—Exports of machinery in January show a slight improvement over December, but are still running nearly 40 per cent behind the rate of shipment at the beginning of 1930. Figures gathered by the Commerce Department show that the value of all machinery shipped out of the country to have been $54,103,509. This compares with $53,468,385 in December and $88,621,957 in January, 1930. During the six months ended with December the value of machinery exports was $313,216,355. This compares with $527,973,655 for the corresponding period of 1929. The figures for the major subdivisions are as follows:

	January, 1930	January, 1931
Electrical machinery and apparatus	$11,454,548	$7,042,920
Construction and Conveying machinery	2,833,729	994,522
Mining, well and pumping machinery	5,557,289	4,443,885
Power-driven, metal-working machinery	3,219,537	2,766,930
Textile machinery	1,063,991	558,104
Sewing machines	729,490	392,269
Shoe machinery	158,910	112,840

Depite the general decline several items of metal-working machinery showed an increase in January of this year, as compared with January, 1930. This applies particularly to lathes, rolling mill machinery, and certain types of drilling and grinding machines. The detailed figures follow:

	January, 1930	January, 1931
Engine lathes	$98,240	$169,005
Turret lathes	56,779	67,318
Other lathes	95,606	148,692
Vertical power mills and chucking machinery	77,950	88,154
Thread cutting and automatic screw machines	137,504	30,418
Knee, and column type milling machines	118,334	45,214
Other milling machines	363,303	67,803
Gear cutting machines	74,768	51,040
Vertical drilling machines	96,699	24,054
Radial drilling machines	10,917	11,829
Other drilling machines	80,256	103,665
Planers and shapers	102,998	140,702
Surface grinding machines	29,531	21,466
External cylindrical machines	147,970	59,793
Internal grinding Machines	77,553	46,047
Tool grinding, cutter grinding and universal grinding machines	102,754	47,776
Other metal grinding machines	75,384	106,604
Sheet and plate metal-working machines	285,635	413,478
Forging machinery	283,402	252,428
Rolling mill machinery	91,114	381,258
Foundry and moulding equipment	141,018	233,171
Other power-driven, metal-working machinery and parts	671,832	327,015
Other metal-working machinery	409,114	307,293

Trade in manufactured articles showed the greatest increase, notably with respect to capital goods, machinery, and other equipment; while many consumer goods, products of cotton and wool, showed little progress and, in some cases a decline. The first ten countries on the League's list of eighty odd, headed by the United States, the United Kingdom, Germany, France, and Canada, followed by India, Japan, Holland, Italy, and Belgium, accounted for over 60 per cent of world trade, both in 1928 and 1929. The first five countries were credited with 46 per cent.

In 1929, the greatest export increase was for Germany, followed by the United States and the United Kingdom. France showed a decrease and Canada one still greater, rather more than a quarter of a million dollars in value, a sum equivalent to Germany's increase. Great Britain's exports of electrical goods and apparatus were valued at £13,200,000; those of machinery, apart from the above, £41,200,000; and vehicles, including automobiles, ships, and aircraft, £50,200,000. The increase over 1928 was 5.2 per cent. Germany's total value of foreign transactions was affected by a lesser amount of imported capital. Imports were generally cut down but exports continued to advance rapidly. Actually, exports were 94 per cent above what they were five years before and but 5 per cent less than in 1913. The trade deficit, which in 1927 amounted to 4 million marks, was reduced to 800,000 marks.

Iron and steel manufactures exported, valued at 1,699,000,000 marks, was an increase of 19.4 per cent; machinery, of a value of 1,250,000,000 marks, showed an increase of 22.2 per cent, and electrical products, of a value of 481,000,000 marks, increased 20.9 per cent. Of Germany's total exports, 76.6 per cent went to European countries.

A new yard-stick has been applied by the League experts for measuring foreign trade. Of the first twelve countries whose incoming and outgoing trade is the greatest, seven are within the British Empire and four others in the North of Europe. Nine of the twelve have a per capita trade of $200. The United States is twenty-fifth in the list with a per capita trade of $77.44. Its imports are given as $35.35. New Zealand's imports per head are valued at $157.69; Denmark's, $129.90; Belgium's, $118.83; Switzerland's, $127.45; Great Britain's, $118.14, and the Irish Free State's, $99.73. United States exports per capita are valued at $42.09; those of Germany, $51.91; those of Great Britain, $77.52. China imports to the value of but $1.79 per head per annum, and exports $1.36.

Thirty countries show a lower trade record per capita than in the previous year. Of these, three—Switzerland, Austria, and Czechoslovakia—have highly developed industries and their decline was insignificant.

World's Machinery Trade Reviewed by League

FRANCIS M. MANSFIELD
Paris, France

A FORMIDABLE report, "International Trade and Balances of Payments," by the Economic and Financial Section of the League of Nations, referring to the years 1927, 1928, and 1929, analyzes world trade of the latter year as 2 per cent greater in value than in the previous year. World prices having fallen by rather more than 2 per cent, the *quantum* of goods exchanged was accordingly 4 per cent greater. Exports of the European group of countries increased 3.6 per cent in value; those of the North American group fell 2.3 per cent.

An important part of the world's imports of capital goods, referring especially to industrial equipment, machinery, and motor cars, was to the credit of the United States. Of the world's export trade in machinery, the United States' share was 23.2 per cent, nearly double that of the year before. Its iron and steel products indicated 11.5 per cent increase, virtually on a par with the increase of the previous year. Germany's increase of machinery exports was 22.2 per cent.

Gray Iron Report Shows Upturn

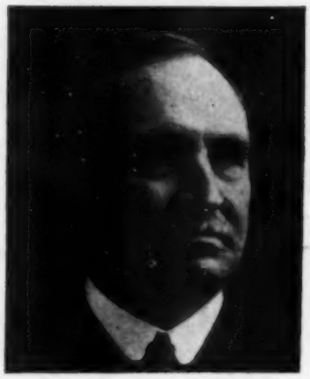
The January Trade Report of the Gray Iron Institute, Inc., shows an upward trend in business conditions in the East and a very favorable upward trend in the East Central area. However, the Middle West shows a decrease of approximately 3 per cent from last month. Almost the entire increase in production has occurred in foundries having 101 to 250 tons per month. January production shows 52.1 per cent of normal, as compared with 48.5 per cent in December, 1930, and 88.5 per cent in January, 1930. New Business in January was 51.4 per cent, as compared with 47.2 per cent in December and 89.4 per cent in January, 1930.

RESEARCH Graduate Assistantships in the Engineering Experiment Station of the University of Illinois include 14 with annual stipends of $600 each, and are open to graduates of approved American and foreign universities and technical schools. Application for appointment should be sent in by April 1, 1931, to M. S. Ketchum, Dean.

Alexander Luchars

Alexander Luchars, 77, President of The Industrial Press, died Thursday, Feb. 19, at his home in Upper Montclair, N. J., of pneumonia. He was born at Quincy, Mass., February 10, 1854, and for 37 years had been the publisher of *Machinery*, which he founded in 1894.

Mr. Luchars was educated at the Chauncey Hall School, Boston, Mass., and at the Massachusetts Institute of Technology where he took a course in architecture. After having been engaged



for some years in an architect's office in Boston, he left this work to take up the publishing business, establishing himself in this field in New York in 1889, where he founded The Industrial Press. He published a number of journals in the engineering field, but finally devoted himself entirely to the machinery industries, which he served through *Machinery* and an extensive line of books on mechanical engineering subjects. He also established the Machinery Publishing Co., Ltd., of London, England, publishers of the British publication *Machinery*.

He took an active part in furthering the interests of the machine tool and shop equipment industries, and leaves many warm friends among machinery manufacturers throughout the country. In 1919 the Secretary of Commerce appointed Mr. Luchars to study the machinery markets in Europe. He was a former governor of the Machinery Club of New York.

Mr. Luchars married Sarah R. Yarnall in Philadelphia in 1885, who survived him but a few hours. Her death also resulted from pneumonia. They are survived by one son, Robert B. Luchars, Vice-President of The Industrial Press, and by two daughters.

New York Safety Conference

The Second Annual Greater New York Safety Conference was held at the Hotel Pennsylvania Feb. 25 under the auspices of the American Society of Safety Engineers. Dr. Louis I. Dublin, of the Metropolitan Life Insurance Company, pointed out that of 100,000 annual accidental deaths about one-third were caused by the automobile. He denounced automobile manufacturers for their apathy in meeting this serious situation. Charles H. Hill, of the New York Central Railway, described the pioneer work of the railroads in the field of safety. Only 49 passengers were killed in railroads during 1930 as against 350 in 1913. Similar phenomenal gains were made for railroad employees. Charles W. Berquist, President of the National Safety Council, pointed out that safety costs, direct and indirect, were $20 per capita in the United States and decried the false economy of curtailing prevention activities.

A.S.T.M. Committees Meet in Pittsburgh

The standing committees of the American Society for Testing Materials will hold their Annual Spring Group Committee Meetings in Pittsburgh, beginning Monday, March 16, and extending through Friday, March 20. In conjunction with these is the Regional Meeting, sponsored by the Society, which will be held Wednesday, March 18, taking up the greater part of the day. Included in the committees which will hold meetings are: Steel, Tubes and Pipe, Staybolt and Engine-Bolt Iron, Cast Iron, Corrosion of Iron and Steel, Magnetic Properties, Malleable Castings, Magnetic Analysis, Iron-Chromium, Iron-Chromium-Nickel and Related Alloys, Cast Metals and Alloys, Light Metals and Alloys, Cast and Wrought, Indentation Hardness, Impact Testing, Elastic Strength of Materials, Metallography, Fatigue of Metals, Zinc Coating of Iron and Steel.

The Second Regional Meeting, sponsored by the American Society for Testing Materials, will be held in Pittsburgh at the Hotel William Penn, March 18. The Pittsburgh District Committee, with the co-operation of the Pittsburgh Section, American Welding Society, has arranged for a symposium on Welding. Two sessions of three hours each will be devoted to the presentation of papers and discussion. Five papers will be read at the morning session covering processes, materials, and application of welding and five papers at the afternoon session, dealing with inspection and testing of welded products.

APPROXIMATELY 60,000,000 lb. of copper will be required for completion of the Pennsylvania Railroad's electrification program, just announced by General Atterbury, according to an estimate of the Copper & Brass Research Association.

THE Department of Manufactures of the Chamber of Commerce of the United States is issuing a series of bulletins on cost accounting, including one on Costs-Markets-Prices and another on Material Costs in Industry.

MORE than $22,000,000 was spent by 400 trade associations last year in carrying on trade promotion work, according to a preliminary survey made by the Trade Association Department of the Chamber of Commerce of the United States.

BUSINESS ITEMS

A new one-story addition to the Barber-Greene Co., Aurora, Ill., road machine and equipment manufacturing plant, with 72,000 sq.ft. will be opened late in the spring, W. B. Greene, Vice-President, has announced. Work upon the structure is already under way and it will be ready for occupancy within 10 weeks. The building will represent an investment of $200,000.

The Vermont Tap & Die Co. has been established at Lyndonville, Vt.

The New England Steel Tank Co., manufacturing products of steel plate, has been established in Boston, Mass.

The Warman Steel Casting Co., Los Angeles, Calif, has been licensed by the Krupp-Nirosta Manufacturing Co. to act as Southern California manufacturers of Nirosta KA2 castings.

Bending rolls having a capacity to handle steel sheets up to 6 ft. in width and ⅜ in. in thickness have been installed at the plant of the Westminster Boiler & Tank Co., 1103 Columbia St., New Westminster, B. C.

The Canadian Equipment Co. Ltd., Montreal, has appointed A. E. Collins as Toronto representative with headquarters at 497 Sherbourne St.

The Minneapolis-Moline Power Implement Co., Minneapolis, Minn., is constructing a factory distribution branch in Los Angeles, Calif.

The O. K. Manufacturing Co., Oswego, N. Y., has been purchased by the Scovill Manufacturing Co., Waterbury, Conn., and will be moved to Waterbury.

The British Columbia Equipment Co. Ltd., has been incorporated by provincial charter with head office at Vancouver. Authorized capital is $500,000. The company will deal in all kinds of machinery, building, and engineering supplies.

The Reising Arms Co., New York, has incorporated under Connecticut laws with Waterbury the anticipated location. The company manufactures 22-cal. automatic rifles and it is expected will locate its entire business in Waterbury.

The entire plant, machinery, equipment, land, and buildings, of The American Steel Co. of Indiana, Terre Haute, will be sold at public auction on Tuesday, March 17, by the Industrial Plants Corporation of Ohio, with principal offices in the Columbian Bldg., Columbus. The American Steel Company has been in receivership for some time.

The Illinois Testing Laboratories, Inc., 141 W. Austin Ave., Chicago, Ill., has appointed Ernest H. Du Vivier, 30 Church St., New York City, as representative in metropolitan New York and northern New Jersey, and F. W. Fernald, 335 Fifth Ave., Pittsburgh, Pa., as representative in western Pennsylvania and West Virginia.

PERSONALS

J. R. Adams of the Midvale Steel Co., will speak on "Heavy Steel Forgings" at the March 11 joint meeting of the Susquehanna Local Section, A.S.M.E., and the Local Section of the A.S.S.T.

H. W. Anderson has been elected assistant secretary of Whitman & Barnes, Inc., Detroit.

O. F. Baughman, First Vice-President of the Dickey-Grabler Co., Cleveland, metal stampings, has been elected president to fill the vacancy caused by the death of Albert H. Dickey

G. H. Blakeley, President of the McClintic-Marshall Corporation, has announced the following executive officers: Elbert A. Gibbs, Vice-President in charge of production; Charles M. Denise, Vice-President in charge of sales, and E. J. Patterson, Vice-President and Treasurer.

E. Bornstein, formerly comptroller of the Caterpillar Tractor Co., Peoria, Ill., will become secretary of the company April 1, and will move to Peoria from San Leandro, Calif. George L. Bell, formerly second vice-president and sales manager, becomes vice-president in charge of sales; T. C. Connors, who has been assistant to O. L. Starr, vice-president in charge of manufacturing, becomes general factory manager in charge of all manufacturing plants; Mr. Starr becomes vice-president in charge of the research division and will maintain headquarters in San Leandro; Walter Grothe will be his assistant and H. S. Eberhard, chief engineer of the division and J. W. Bridwell, assistant. L. H. Thoen is now chief engineer in charge of the Harvester Research Division. All activities are now being centered at the Peoria office.

W. L. Bosley has resigned as purchasing agent of the Cleveland district for Peck, Stow & Wilcox Co., Southington, Conn., to join the sales organization of the Western Automatic Machine Screw Co., Elyria, Ohio, as assistant to W. W. Kimbrough, 541 Engineers' Bldg., Cleveland.

Lee M. Clegg, Sales Manager for Thompson Products Inc., Cleveland, since 1927, has been appointed vice-president in charge of sales.

A. C. Danekind of the General Electric Co., will speak on "The Relation of New Machine Tool Design to the use of Tungsten-Carbide and Anti-friction Bearings" at the March 5 joint meeting of the Bridgeport Local Section, A.S.M.E., the Engineers Club, and local sections of the A.S.S.T., and other technical societies.

Dr. C. L. Dine has been elected president of the St. Mary's (Ohio) Foundry Co. Charles Dine was elected vice-president and general manager, and J. W. Eiting, secretary-treasurer.

William C. Ellis and Crockett Ellis have taken over the operation of the Vulcan Iron Works of Memphis, Tenn., formerly operated by their father, S. J. Ellis, who has retired after 46 years of continuous service.

Roy E. Greenwod, formerly associated with the Simonds Saw & Steel Co., Fitchburgh, Mass., has been appointed assistant general manager of sales of the American Chain Co., Inc., Bridgeport, Conn., and associate companies.

John C. Griffin has become eastern sales representative for the United Engineering & Foundry Co., Pittsburgh. Mr. Griffin was formerly manager of the sheet and tin mills of the Bethlehem Steel Co., at Sparrows Point, Md.

James W. Hook, President of the Geometric Tool Co., New Haven, Conn., is Chairman of the Connecticut State Emergency Committee on Employment which recently presented its report to Governor Wilbur L. Cross.

Col. Robert L. Hubler of Dayton, Ohio, has been elected to the board of directors of the Ohmer Fare Register Co. He is general sales manager.

Dr. J. T. Hughes has been elected president of the Jefferson Iron Co., Portsmouth, Ohio. Other officers are: Mostyn Jones, vice-president, and Joseph J. Jones, secretary and general manager. These officers, J. N. Davis, and Len Hughes comprise the directorate.

Howard E. Coffin and W. L. Stadler have been elected directors of the Bower Roller Bearing Co., to fill the vacancies caused by the resignation of Charles Wright, Jr., and the death of Nelson Mearick.

HOWARD E. COFFIN

C. F. Hirshfeld, Chief of Research of the Detroit-Edison Co., spoke on "Research in Industry" at the Feb. 24 meeting of the Philadelphia Local Section, A.S.M.E.

A. F. Johnson, of the Sundstrand Machine Tool Co., Rockford, Ill., has been elected a director.

George Jones, David Jones, J. P. Buscher, J. I. Callahan, M. J. Bernet, F. E. Davis, and C. J. Boldt, have been elected directors of the Geometric Stamping Co., Cleveland.

Charles G. Jurack has joined the Chain Belt Co., Milwaukee, in the Foundry Equipment Division. He was formerly with the Milwaukee Foundry Equipment Co.

Alexander H. Legge, Chairman of the Federal Farm Board since July 1, 1929, is expected to retire on March 4 to resume the presidency of the International Harvester Co., Chicago.

R. B. MacMullin of the Mathieson Alkali Works, Inc., New York City, will spea on "Probability in Grinding" at the March 5 meeting of the Buffalo local section, A.S.M.E. F. P. Huston of the International Nickel Co., will speak on "Nickel and Its Application to Industry" at the March 17 meeting of the section.

Paul D. Merica of the International Nickel Co. will speak on "Non-Ferrous Metals" at the March 5 meeting of the Metropolitan Section, A.S.T.M. J. A. Capp of the General Electric Co. will discuss "Electrical Materials."

D. C. Prince has been appointed engineer of the switchgear department of the General Electric Co., Philadelphia, including supervision of switchgear research activities at Schenectady.

J. Henry Roraback, President of the Connecticut Electric Service Corporation, Hartford, Conn., and head of electric power generating companies throughout the State, has been added to the Board of Directors of the Eastern Machine Screw Corporation, New Haven, Conn.

M. J. Steel, in charge of Diesel design at the Packard Motor Car Co., will speak on "The Packard Diesel Aircraft Engine" at the March 12 meeting of the Schenectady Local Section, A.S.M.E.

William B. Todd has been appointed general manager of sales of the Jones & Laughlin Steel Corporation, Pittsburgh. He was formerly assistant general manager of sales.

George P. Torrence, Vice-President of the Link Belt Co., Indianapolis, was recently re-elected first vice-president of the Associated Employers of Indianapolis. Included among the directors are O. B. Iles, head of the International Machine Tool Co., Guy A. Wainwright of the Diamond Chain Co., Fred C. Gardner, treasurer of E. C. Atkins & Co., and J. S. Holliday, head of the W. J. Holliday & Co., Inc.

E. R. Wegener has been elected president of the Detroit (Mich.) Forging Co. J. Farrand Williams is vice-president and N. H. Macqueen is secretary-treasurer.

F. B. Williams, Jr., Sales Manager of the Diehl Manufacturing Co., Electrical Division of The Singer Manufacturing Co., Elizabethport, N. J., has been elected vice-president in charge of sales. Mr. Diehl joined the Diehl company in 1913 and was appointed production manager two years later. He left the Diehl company in 1918, but returned in 1927.

R. G. Waldron, Production Manager, Hudson Motor Car Co., has succeeded R. S. Perry, resigned, as general plant manager. W. H. Lyman, Factory Manager, has also resigned and R. G. Hopkins, formerly Mr. Lyman's assistant, has succeeded him. Harold F. Cates, formerly plant engineer, has joined Mechanical Handling Systems, Detroit, as chief engineer.

Myron E. Forbes has been appointed vice-president in charge of financial matters for the Oliver Farm Equipment Co.

OBITUARIES

Philip L. Allison, executive of the Canadian General Electric Co., for the past 27 years, and leading mechanical engineer, died in Peterboro, Ont., last week after a short illness.

Richard Bates, 61, Superintendent of foundries for the American Car & Foundry Co., died at his home in Berwick, Pa., on Feb. 20.

Harrison S. Bowen, 59, prominent Chicago mechanical engineer, died at Wilmette, Ill., Feb. 14. He had been with the Robert W. Hunt Co., since 1896 as mechanical engineer engaged in the investigation and efficiency testing of all kinds of power units.

Clinton S. Bradley, 58, General Manager of sales for the Jones & Laughlin Steel Corporation, Pittsburgh, died suddenly Feb. 18 after a week's illness.

Anthony Elsinghorst, 82, prior to his retirement in 1911 president of the Elsinghorst Sheet Metal Co., Buffalo, N. Y., died Feb. 20 in Buffalo.

William J. Evans, 70, Pittsburgh district agent for Titanium Alloy Manufacturing Co., Niagara Falls, N. Y., died recently there.

Willis E. Gray, 74, formerly president of the Rome Locomotive Works, Rome, N. Y., died recently in Westfield, N. Y., following a long illness. For several years he was chief engineer of the American-China Development Co. He retired six years ago.

Walter Green, 50, industrial consulting engineer of Salt Lake City, Utah, died Feb. 9 in Moline, Ill. following an attack of pneumonia. In 1916 he organized the Green Machinery Company, of which institution he was president.

James J. Hinde, pioneer automobile manufacturer, founder and president of the company begun in 1902 to produce the "Courier" automobile, died at his home Feb. 23, at Sandusky, Ohio.

Brown Joyce, 40, Director, Vice-President, and General Sales Manager of the Wallace Barnes Co., Bristol, Conn., died Feb. 27 there after a 2-month illness.

John G. Ladrick, 65, for 42 years connected with the Cleveland Twist Drill Co., Cleveland, Ohio, died Feb. 14, in Geneva, Switzerland. He was born in Thun, Switzerland, and came to the United States at the age of 17. For the past 20 years he had been company representative in the territory west of the Rockies, until illness caused him to retire in 1930.

Robert A. McKean, 67, Vice-President of the McClintic-Marshall Co., Pittsburgh, died Feb. 18 in that city.

William J. Patterson, 65, President of the Heyl & Patterson Inc., Pittsburgh, died in that city Feb. 21.

J. R. Haynes, 62, purchasing agent for the Chicago, Burlington & Quincy Railroad, died Feb. 20 in Chicago after a brief illness with pneumonia.

John J. Shryock, 77, founder of the Meadville Malleable Iron Works and director in a half dozen northwestern Pennsylvania industrial concerns, died at his home in Meadville, Pa., recently following a long illness.

George F. Stewart, 64, President of the Bradford Machine Tool Co., Cincinnati, Ohio, from 1900 to 1926, one of the first members of the National Machine Tool Builders' Association and active in the latter group until he retired from active business in 1926, died Jan. 23.

Thomas D. Thomas, 81, formerly an executive of the Hayden Foundry Co., Columbus, Ohio, died Feb. 20.

Calvin H. Wilson, 49, for thirteen years secretary of the Insley Manufacturing Co., Indianapolis, died recently at his home. He had been ill ten days.

Lothar R. Zifferer, 41, inventor of a type of expansion bolt, died in Columbia, Pa., of pneumonia, Feb. 19. Mr. Zifferer was the organizer of the Standard Expansion Bolt Co., and the United States Expansion Bolt Co. He was also president of the Columbia Malleable Casting Corp., the Canadian Expansion Bolt Co., and the Hygeia Can Co., Utica, N. Y.

FORTHCOMING MEETINGS

AMERICAN SOCIETY FOR TESTING MATERIALS — Annual Spring Group Committee meeting, Pittsburgh, March 16-20. C. L. Warwick, Secretary-Treasurer, Engineers Club Bldg., 1315 Spruce St., Philadelphia.

AMERICAN STEEL & HEAVY HARDWARE ASSOCIATION — Annual meeting, Pittsburgh, Pa., March 18-20.

STEEL FOUNDER'S SOCIETY OF AMERICA—Sales clinic and regular meeting, March 19-20, Neil House, Columbus, Ohio. G. P. Rogers, Managing Director, 932 Graybar Bldg., New York City.

THREE-M-CONGRESS — Management, Maintenance, and Materials Handling Congress and Second National Industrial Equipment Exposition, Cleveland, Ohio, April 13-18. 1931. In the Arena and Exhibit Hall, Cleveland Public Auditorium. Information from the A.S.M.E., 29 West 39th St., N.Y.C.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Calvin W. Rice, executive secretary, 29 West 39th St., New York. The following meetings are scheduled:

Semi-Annual meeting, Birmingham, Ala., Apr. 20-23, 1931.

National Aeronautic Meeting, Baltimore, Md., May 12-14, 1931.

National Applied Mechanics Meeting, Purdue University, Lafayette, Ind., June 15-16.

AMERICAN FOUNDRYMEN'S ASSOCIATION—Annual convention and exhibition, Stevens Hotel, Chicago, May 4-8, 1931, C. E. Hoyt, 222 West Adams St., Chicago, secretary.

AMERICAN GEAR MANUFACTURERS' ASSOCIATION—Annual Spring Meeting, Hotel Statler, Buffalo, May 7-9, 1931. T. W. Owen, 3608 Euclid Ave., Cleveland, secretary.

NATIONAL FOREIGN TRADE COUNCIL —Annual Convention, May 27-29, at the Hotel Commodore, New York City. O. K. Davis, secretary, 1 Hanover Square, New York, N. Y.

AMERICAN MANAGEMENT ASSOCIATION—Annual Conference, Production Division, Rochester, N. Y., June 1-2, (approximate, exact dates later). Theme "Control of Manufacturing Overhead." Headquarters, 20 Vesey St., N. Y. C.

NATIONAL ASSOCIATION OF PURCHASING AGENTS—Annual Convention and Informashow, Royal York Hotel, Toronto, Canada, June 8-11. G. A. Renard, Secretary-Treasurer, 11 Park Place, New York.

AMERICAN SOCIETY FOR TESTING MATERIALS—Annual Meeting, Stevens Hotel, Chicago, June 22-26. C. L. Warwick, 1315 Spruce St., Philadelphia, is secretary-treasurer.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Annual Summer Convention, June 22-26, Asheville, N. C. F. L. Hutchinson, 33 West 39th St., New York, N. Y., secretary.

THE INDUSTRIAL REVIEW

Weekly progress of the machinery and machine tool business

■

INQUIRIES continue to be the basis for the optimism of machinery men. An occasional list and a number of good single inquiries, together with a better attitude on the part of prospects, lends decided encouragement, even though orders are only holding even. Sales now being made are largely the result of long-continued sales effort or absolute need on the part of the purchaser. Machinery men explain that the situation is full of promise, but promises pay no rent bills.

NEW YORK'S market remained about even in February, though one or two dealers considered the month exceptionally good. Two price increases—one 40%, one rumored—were reported, and inquiries are still improving. Indianapolis is also holding steady, sales now being to sand and gravel, contracting, cement mill, and crushed stone interests as a result of the State road program. Canadian sales are increasing steadily, and industrial prospects are improving. New England industrial and export tool prospects are better, but inquiries are off and there is much competition for sales.

CINCINNATI manufacturers and dealers are holding about even, a few of the manufacturers, however, reporting a better February. Detroit also holds about even, though a decided upturn is expected during the next six weeks. There are persistent recurrences of the 8-cylinder Ford rumor, recurrences which offer tool possibilities. Chicago inquiries are chiefly from railroads, and business there has not held the improvement noted at the beginning of February. Buffalo, expecting no sharp upturn, is satisfied with a gradual improvement and a bettered inquiry situation.

NEW YORK

Again the New York market shows little change. Dealers in most cases are holding about even, though one or two of them report particularly good weeks. One dealer, for example, has sold five large standard machines within the last two weeks; another reports the best month's business for a year. One dealer reports a slight drop, attributed to the shortness of the month. Inquiries are still improving, many of them of the type dealers like to see; but when followed up, it is still impossible to get those in charge of the purse strings to slacken their death grip. The Navy is still figuring on the group of lathes mentioned in these columns some time ago, but inquiries are expected soon. The D. & H. is expected to close part of its list during this week. Two price raises are reported, one an increase of 40 per cent to list price on a line of pipe machines. Several dealers have contracts to rebuild equipment they have supplied, and several have found used tools at the end of a new tool lead. Despite industry's better feeling and increased figuring on new construction, tool dealers are still getting their orders by pushing doorbells and camping on doorsteps. There are rumors of German copies of American tools soon to be sold in this market.

INDIANAPOLIS

Demand for machinery and machine tools in this territory shows continued steadiness with several classes of consumers that have been very poor customers for months coming back into the market. There are some disappointing features, however. Railroad buying is particularly limited and there are no lists out that would indicate any more than average business during the spring and summer. There are, however, more men being put back in the shops of the state.

Demand from the automobile industry also is disappointing. However, there is much encouragement in inquiries received from contractors. The state will do more road work this year than ever before, and contracts already are being let. This road program also is responsible for the good volume of special equipment being sold to the sand and gravel producers and to the cement mills and crushed stone factories.

The past two weeks have seen a good volume of small tools and equipment sold to air fields. There has been a falling off in demand for special woodworking equipment for the furniture industry. Dealers in used machinery report a fair volume of inquiry, but there is a tendency to beat down prices.

CANADA

Industrial conditions generally are undoubtedly swinging back to normal. The improvement is especially noted in the metal-working field where the majority of plants are now working at greater capacity. The increased schedules on which some of the iron and steel plants are beginning to operate seem encouraging, in comparison with the depressed state of the industry a few weeks ago. The increase in operations promised by recent railroad orders and the prospect of renewed demand from automotive plants in the spring have resulted in a feeling of confidence which was entirely lacking at the beginning of the year.

Machine tool dealers report that bookings have been increasing slightly each week since the beginning of February and that inquiries are particularly encouraging. Manufacturers of electrical appliances are working at greater capacity, there being a particularly good demand from dealers in the province of Quebec and in the Maritime Provinces.

NEW ENGLAND

The machine tool situation developed little change during the past week. Orders were placed at about the same rate with a steadiness that offers some constructive encouragement. Inquiries, however, were not as plentiful, and strong competition is apparent over all prospective business that is really alive. Foreign demand is a real factor in trading.

Industrial conditions offer the best indication of an upward trend in these six states. Recent gains in the shoe, textile, metal, woodworking, and alloy industries have been of a substantial nature.

The automotive industry has stepped up a pace, resulting in material gains in the machine tool market. Progress from this source is still painfully slow. In the aeronautical field the Chance Vought Corporation, East Hartford, has received an order for 25 Navy observation planes of the 03U-1 type.

CINCINNATI

The arrival of harbingers of spring gives hope to machine tool manufacturers that business, like nature, is about to awaken from its long winter sleep. With a few the demand was a shade better than in the previous week and with some there was a slight gain in the month. Local selling agents note no change, but are not without hope that things are about to take a turn for the better.

The past week's sales were largely confined to single items, bought by general machinists and miscellaneous users, the business being well diversified and well scattered. Taking the trade as a whole, a good number of inquiries were received, these in the main being from miscellaneous users whose requirements were single tools.

DETROIT

Thus far the total volume of orders received has not been strikingly in excess of the business in 1930. Dealers all believe it will increase steadily in the next few weeks, however. Inquiries are gaining in number and in importance, the general attitude of the motor manufacturers and accessory builders is improving, and the interest of the public in new cars is radically different from what it was last year.

There is a persistent rumor that Ford will soon start producing his 8-cyl. car, the "Edison," to be sold for about $800. The present Ford car is to be reduced in price to about $300, according to reports. Machinery men say Ford could easily be tooling for the new eight, without attracting any particular attention. They believe it would be easy to convert much of the old machinery for use in producing the eight. Briggs is said to be in receipt of a large order for bodies for the new car but this cannot be verified.

CHICAGO

Business in machine tools for the month of February has not come up to expectations. During the early part of the month the improvement shown in January was fairly well maintained, giving rise to the belief that the upward trend would continue. Disappointment has been expressed that it has not done so, for, with the exception of one or two lines, there has been a falling off. One of the exceptions noted is that of hack and band saws, which since the first of the year, and until this week, have sold better than for months. Inquiries received are chiefly from railroads. They include the following: The Elgin Joliet & Eastern is in the market for a motor-driven bench grinder, a 12-in. wheel floor grinder, and two 18-in. wheel floor grinders. The Chicago, Aurora & Elgin is inquiring for a 14-in. motor-driven floor grinder. The Colorado Fuel & Iron Co., Pueblo, is asking prices on a ⅞-in. pneumatic riveter for structural rivets; also for a double-end angle shear for 6x6x⅞-in. angles.

BUFFALO

Indications of a gradual improvement in business continue. It is more and more evident as time goes on that no sharp upturn in business need be expected now. Inquiries, however, have improved somewhat in volume and there seems to be real indications that many of them will be closed before mid-year. Large orders are rare. Usually they are for single pieces of equipment. Conditions in Buffalo seems to be better than in the smaller industrial centers throughout western New York, although employment conditions are improving generally. In most cases the taking on of workers is rather gradual and is done, not in anticipation of business, but as a direct result of orders.

BUSINESS • BAROMETER

Optimism now prevails in most of our cities, and a distinct business revival is expected when business is substituted for politics

THEODORE H. PRICE
Editor, Commerce and Finance, New York

MOST of us have been taught to believe that the world is round. We have no physical consciousness of the fact, but we accept it upon the authority of those who are credited with knowing more than we do. Our knowledge of the subject is, however, academic, and as we look out upon the boundless prairie it becomes almost impossible for us to visualize a spheroid world.

So it is with what we call economic laws. It includes a great many newly found rules with which we are just becoming acquainted. It may be that some of them were never in force, while others have been totally disregarded. There are a few who insist that much of what we call economic law is a dead letter, and that we will be remaking the status and public opinion upon which all such laws depend for a century.

It is an interesting speculation, and last week was an interesting example of it. There is a marked change in the business outlook. Just why it came when it did is puzzling many people, but it has come. It is here, and the stock market is literally booming in the hope of a more active and exhilarating future. Reports from various business fields encourage this expectation. Cotton is the only commodity that is sensationally higher, but it is an important commodity, and the fact that it has climbed to nearly two cents above the lowest figures touched has encouraged many to hope that the advance will soon include the other commodities that are now so widely dealt in. Hence some think that we may soon have an all-round bull market.

It is the prospect of such a market that makes America happy, but in the enjoyment of this happiness sight should not be lost of the ultimate reaction that is sure to come. In venturing this suggestion it is not to be understood that a decline is predicted. Cheap money, light stocks, low prices, and a willingness to help by spending money for necessary improvements will go a long way toward rejuvenating business activity. In many directions there is a commercial vacuum that must be filled before distributors provide themselves with even normal stocks. There is only one feature that need give merchants and manufacturers much concern at present. It is the low price of silver. This silver question means a great deal more than most people appreciate. Therefore, it is reassuring to learn that the financiers of Great Britain are studying the situation, and that they will co-operate in an effort to mend it just as soon as a practicable plan can be agreed upon. It is unlikely that the subject can be adequately dealt with in this country until next December. Congress is about to adjourn and will not be in session again until December, 1931, and people will have time to consider the silver question thoughtfully and in all its aspects.

The advance in cotton which started early in the week was mostly due to the large goods sales that the mills have recently made, but it is supported by the belief that the Government will not sell any of its holdings unless a price that is much above the current level can be obtained for it. If this belief is fostered by the Federal Farm Board a further and a substantial advance is quite possible.

It is estimated that the amount of cotton under Government control exceeds 3,500,000 bales. None of this cotton is now for sale, and in so far as the available supply is concerned spinners are in much the same position that they would be if this season's crop was only 10,500,000 instead of the 14,000,000 that have probably been picked. The difference of 3,500,000 bales is in existence, but for the present at least it is practically non-existent, and it is not likely to be sold until the minds of spinners and Uncle Sam have met.

Reports on general business are distinctly encouraging, and the heavy expenditures for relief and public works that have been undertaken ought to provide employment for most of those who are now idle and willing to work. In some cities the number of unemployed is said to be smaller than it was, and reports received from other centers indicate that the number of jobless men has been exaggerated.

Money is still in abundant supply, but it is not quite as easy as it was a week ago. Therefore, those who use borrowed capital are advised to secure their requirements for the next six or eight months. Bonds and stocks have had a substantial advance. Bullish sentiment is still spreading, and stocks are being bought quite freely by the public. A repetition of the Coolidge boom is not, however, expected.

Now that the bonus loan bill has been passed it is realized that apprehension as to its effects has been overdone, and bond prices probably will resume the upward trend that is indicated by the abundance of money. As a generalization it may be said that optimism now prevails in most of our cities. Even the farmers seem to be becoming a little more cheerful, and a distinct revival in business is expected as soon as men are able to put aside politics and devote themselves to business, including the business of helping their fellow farmers who were so sorely drought stricken.

THE BUSINESS WEEK

March 4, 1931

Telescopes trained on foreign affairs yield more for the optimist this week than do economic microscopes examining domestic movements. . . . Fumbling gestures toward closer European co-operation, in politics, in agricultural problems, in finance, and a slight upturn in British prices may be significant straws. . . . Abandonment of our embargo efforts may be counted among these constructive international indications. . . . At home there is still no decisive evidence of business change. . . . Our index is practically stationary at 78.2% of normal, about the average level of the past two months. . . . Steel activity shows no sign of marked increase in demand from the big consuming industries, and spring automobile sales prospects are still uncertain. . . . Strengthening of raw cotton prices, textile demand, and residential building projects has begun to stir some enthusiasm, but spring fever is probably a sufficient explanation of the rise in stock market prices and activity, perfectly paralleling last year's. . . . Expansion of bank investments is somewhat encouraging, but as yet indecisive of any definite change in credit policy. . . . Liquidation of commercial loans and contraction of Reserve credit continue. . . . After all, the most cheering business news of the week will be the rush order of caskets for the 71st Congress.

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THE WEEKLY PRICE GUIDE . . . .

Rise and Fall of the Market

UNCERTAINTY prevails in the market for non-ferrous metals especially where tin and lead or their alloys are concerned. In tin, the difficulty lies in the efforts of producers to restrict production. The lead market is equally uncertain. Conflicting rumors make it impossible for the consumer to sense the direction in which prices may turn at any moment. Prices of these metals are lower now than in many years and every possible effort is being exerted by producers to bring the market to a semblance of stability. Fabricated brass and copper is up ½c. per lb. in most cities. New York prices of scrap brass and copper also are higher. In steel products, prices are steady for the most part, with automotive buying more active than at any time since autumn.

(All prices as of Feb. 27, 1931)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b.:

CINCINNATI:	
Ala. Foundry (Silicon, 1.75@2.25)	$14.19@$14.69
Tenn. Foundry (Silicon, 1.75@2.25)	14.19@ 14.69
NEW YORK:	
Buffalo No. 2 Fdry. (Silicon, 1.75@2.25)	19.91@ 20.41
BIRMINGHAM:	
No. 2 Foundry (Silicon 1.75@2.25)	14.00
PHILADELPHIA:	
Eastern Pa., No. 2x (Silicon, 2.25@2.75)	17.00
Virginia No. 2 (Silicon, 1.75@2.25)	17.75
Basic	17.25@ 17.75
CHICAGO:	
No. 2 Foundry, Northern (Silicon, 1.75@2.25)	17.50
No. 2 Foundry, Southern	17.01
PITTSBURGH: (including freight charge, $1.76, from Valley)	
No. 2 Foundry	18.13
Basic	17.63@18.63
Bessemer	17.63@18.63

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb.:

Detroit	4.00
Cleveland	4.75
Cincinnati	4.45
New York	4 75@5.00
Chicago	4.50@4.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots:

Blue Annealed*	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	1.90	3.35†	3.00	3.25†
No. 12	1.95	3.45†	3.10	3.30†
No. 14	2.05	3.55†	3.20	3.35†
No. 16	2.15	3.65†	3.30	3.45†
Black				
Nos. 18 to 20	2.15@2.25	3.60†	3.40	3.30
No. 22	2.30@2.40	3.75†	3.55	3.45
No. 24	2.35@2.45	3.80†	3.60	3.50
No. 26	2.45@2.55	3.90†	3.70	3.60
No. 28	2.60@2.70	4.05†	3.85	3.75
Galvanized				
No. 10	2.20@2.30	3.65†	3.50	3.35
Nos. 12 to 14	2.30@2.40	3.75†	3.60	3.40
No. 16	2.40@2.50	3.85†	3.70	3.50
No. 18	2.55@2.65	4.00†	3.85	3.65
No. 20	2.70@2.80	4.15†	4.00	3.80
No. 22	2.75@2.85	4.20†	4.05	3.85
No. 24	2.90@3.00	4.35†	4.20	4.00
No. 26	3.15@3.25	4.60†	4.35	4.25
No. 28	3.40@3.50	4.85†	4.70	4.50

*Light Plates. †400 to 3,999 lb.

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York		Cleveland		Chicago	
	Black	Galv.	Black	Galv.	Black	Galv.
1 to 3 in. butt	56.14%	43.6%	53.3%	42.3%	57.3%	44.8%
3½ to 6 in. lap	52.72%	40.18%	50.8%	37.8%	53.9%	41.4%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	Diameter in Inches—External	Diameter in Inches—Internal	Thickness Inches
1	$0.17	1.315	1.049	.133
1¼	.23	1.66	1.38	.14
1½	.275	1.9	1.61	.145
2	.37	2.375	2.067	.154
2½	.585	2.875	2.469	.203
3	.765	3.5	3.068	.216
3½	.92	4.0	3.548	.226
4	1.09	4.5	4.026	.237
5	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28
8	2.50	8.625	8.071	.277

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb.:

Thickness—Decimal	B.w.g. and Fractions	Outside Diameter in Inches—¼	⅜	½	⅝	¾	1	1¼	1½
		Price per Foot—							
.035"	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23	
.049"	18	.17	.18	.19	.20	.21	.23	.25	
.065"	16	.19	.20	.21	.22	.23	.25	.27	
.083"	14	.20	.22	.23	.24	.25	.27	.29	
.095"	13	.21	.23	.25	.26	.27	.29	.31	
.109"	12	.22	.24	.26	.27	.28	.30	.32	
.120" or .125"	11	.23	.25	.27	.28	.29	.31	.33	
.134"	10	.24	.26	.28	.29	.30	.32	.34	

MISCELLANEOUS—Warehouse base prices in cents per lb.:

	New York	Cleveland	Chicago
Spring steel, light*	4.50	4.65	4.65
Spring steel, heavier	4.00	4.00	4.00
Coppered Bessemer rods	7.00	6.00	6.15
Hoop steel	3.75†	4.00	3.65†
Cold rolled strip steel	4.95	6.00	6.10
Floor plates	4.85†	5.30	5.00†
Cold fin., round or hexagon‡	3.40	3.65	3.35
Cold fin., flat or square‡	3.90	4.15	3.85
Structural shapes	3.10†	2.95	3.00†
Soft steel bars	3.10†	2.95	3.00†
Soft steel bar shapes	3.10†	2.95	2.90†
Soft steel bands	3.40†	3.20	3.10†
Tank plates	3.10†	3.00	3.00†
Bar iron (2.75 at mill)	3.24	3.00	2.90
Drill rod (from list)	65%	55%	60%

*Flat, ⅜-in. thick by ¾-in. wide. †400 to 3,999 lb., ordered and released for shipment at one time. ‡Cold finished steel, shafting and screw stock.

Electric welding wire at New York warehouse—5/32, 8.35c. per lb.; ¼, 7.85c. per lb.; 5/16 to ½, 7.35c. per lb.

METALS

Warehouse Delivery Prices in Cents Per Lb. for Small Lots:

Copper, electrolytic, New York			11.25@11.75
Tin, Straits, pigs, New York			29.00@30.00
Lead, pigs, E. St. Louis	4.35	New York	5.50 @6.50
Zinc, slabs, E. St. Louis	3.95	New York	5.50 @6.50

	New York	Cleveland	Chicago
Antimony, slabs	10.00@10.50	10.50	10.75
Copper sheets*	20.00	20.00	20.00
Copper wire*	12.25	12.25	12.37½
Copper, drawn, round*	18.50	19.00	18.50
Copper tubing*	22.50	22.50	22.50
Brass sheets, high*	17.37½	17.37½	17.37½
Brass tubing, high*	22.25	22.50	22.25
Brass rods, high*	15.62½	15.62½	15.62½
Brass wire, high*	17.87½	17.87½	17.87½

*Mill, base.

MACHINE REQUIREMENTS AND INDUSTRIAL CONSTRUCTION

Equipment Wanted

Mass., Boston — Woodcraft Supply Co., 15 Washington St.—wood turning lathes.

Mass., Cambridge (Boston P. O.)—A. L. Ross, 79 Pearl St.—6 x 24 in. single-surface planer.

Mass., Fitchburg—V. Parker, 53 East St.—oxy-welding outfit, spraying outfit, and auto repair tools.

N. H., Lebannon—A. Shaw, Bank St.—No. 1 Ober Ax handle lathe, Dowell machine.

Que., Montreal — S. Hawa, 96 Laurier Ave. W.—machinery and equipment for proposed automobile repair shop and garage and service station.

Opportunities for Future Business

Calif., Los Angeles—Consolidated Steel Corp., 1200 North Main St., is having plans prepared for 1 story, 120 x 750 ft. welding shops on Slauson Ave. Work will be done by owner's forces.

Conn., Bridgeport — Dugan Bros. Inc., Glenwood Ave., are receiving bids for a 1 story, 60 x 200 ft. garage, service station, etc. on Boston Ave. Estimated cost $60,000. Fletcher Thompson, Inc., 1336 Fairfield Ave., Archt. H. Holder, 252 Franklin Ave., Brooklyn, N. Y., Engr. Noted Jan. 22.

Conn., Bridgeport—Goodrich Silvertown Inc., 386 Fairfield Ave., awarded contract for a 2 story, 30 x 130 and 26 x 50 ft. service plant. Estimated cost $60,000. Noted Jan. 15.

Conn., Cheshire — Connecticut Reformatory, plans the construction of a shop for the manufacture of markers. Estimated cost $40,000. Architect not selected.

Fla., Pensacola—Bureau of Yards & Docks, Navy Dept., Washington, D. C., plans to expend $150,000 for extension of hangar and shop buildings here.

Ill., Chicago—Commonwealth Edison Co., 72 West Adams St., awarded masonry and carpentry contracts for a 3 story, 38 x 124 ft. addition to service building at 2201-09 Throop St. Estimated cost $45,000.

Ill., Chicago — Western Electric Co., South 48th Ave. and 22nd St., awarded contract for foundation for a plant to house loading coils manufacturing department at 26th St. and Cicero Ave. Estimated cost $1,000,000.

Ind., Indianapolis—W. J. Holliday & Co., 545 West McCarty St. (iron) awarded contract for a plant at Missouri and Georgia Sts. Estimated cost $40,000.

Me., Dixfield—Berst-Foster-Dixfield Co., F. W. Smith, Mgr., West Peru, manufacturers of wood products, is having preliminary plans prepared for a 2 story addition to factory. Estimated cost $40,000. Private plans.

Me., Oakland—Getchell Foundry & Machine Co., C. W. Getchell, plans to rebuild 1 and 2 story foundry and wood turning mill recently destroyed by fire. $50,000. Private plans. Work will be done by separate contracts. Noted Jan. 29.

Mass., Fall River—Pilgrim Leasehold Co., 44 School St., Boston, awarded contract for a 2 story, 65 x 160 ft. garage, etc. on Ninth St. Estimated cost $45,000. Work will be done by separate contracts. Noted Feb. 5.

Mass., Medford (Br. Boston) — Somerville Iron Foundry Co., M. D. Bingham, Pres., 83 Washington St., Somerville, will soon receive bids for a 1 story, 55 x 150 ft. plant on Mystic Ave. here. Estimated cost $50,000 to $60,000. Private plans. Noted May 22.

Mass., Springfield—Dept. of Education, plans addition and alterations to technical high school. Estimated cost $150,000. E. C. and G. C. Gardner, 33 Lyman St., Archts.

Mass., Stockbridge—D. D. Hopkins Lumber Co., South Lee, plans to rebuild a 1 story, 60 x 160 ft. woodworking plant recently destroyed by fire. Private plans. Work will be done by day labor.

Mich., Detroit—Bd. of Commissioners, L. P. Fisher, Pres., 735 Randolph St., will receive bids until Mar. 24 for the construction of power plant structures including machine shop, store house, garage, etc. G. H. Fenkell, Gen. Mgr. and Ch. Engr.

N. J., Clifton — Dugan Bros., Inc., 161 Arlington Ave., Newark, awarded contract for a 1 story, 200 x 235 ft. garage, etc., at Broad and Warren Sts. here. Estimated cost $150,000. Noted Feb. 19.

N. J., East Orange — Rocco Realty Co., M. Rousek, Mgr., 507 Main St., is having plans prepared for an auto laundry, garage, etc., at Main St. and North Arlington Ave. Estimated cost $150,000. Architect not announced.

N. Y., Attica—Dept. of Correction, Capitol, Albany, received lowest bid for the construction of a group of buildings, including administration building, state shop building, shop building, textile shop building, maintenance storehouse and service connections, at Attica State Prison here, from J. Weinstein Building Corp., 66 Court St., Brooklyn. $1,432,500. Noted Jan. 29.

N. Y., Brooklyn—Empire State Bag Co., 760 Wythe Ave., plans addition and alterations to factory at Penn St. and Wythe Ave. Estimated cost including equipment $40,000. G. Rieger, 451 West 54th St., New York, Archt.

Every one of these items is reported by our authorized correspondents who are instructed to verify every item sent in. This free weekly service is published in the interests of the buyer and the seller, to bring them together and get machinery moving.

Everything possible is done to insure authenticity and timeliness.

Your co-operation is invited in helping us maintain this service at the highest efficiency.

BUSINESS NEWS DEPARTMENT
Tenth Ave. at 36th St., New York

N. Y., Brooklyn — Owner, c/o J. E. Henry, 189 Montague St., plans the construction of an automobile paint shop at Pacific St. and Underhill Ave. Estimated cost $40,000.

N. Y., Endicott—International Business Machines Corp., 270 Broadway, New York, plans a 4 story, 50 x 56 ft. addition to manufacturing plant here. Estimated cost $150,000. Private plans.

N. Y., Brooklyn—Goal Service Station Inc., 478 Leonard St., is having sketches made for the construction of a service garage at Leonard St. and Engert Ave. Estimated cost $40,000. H. J. Nurick, 44 Court St., Archt.

N. Y., Long Island City—Pittsburgh Plate Glass Co., 16 East 40th St., New York, plans the construction of a service and storage building at 193 Hunters Point Ave. here. Estimated cost $100,000. R. Cole, Inc., 4th Ave. and 21st St., New York, automatic refrigerator equipment distributors, lessee.

N. Y., Naponach—Dept. of Correction, State Capitol, Albany, received lowest bid for the construction of an industrial shop and storehouse at State Institution for Defective Delinquents here. Noted Jan. 29.

N. Y., New York—Consolidated Gas Co., 4 Irving Pl., will soon award contract for a 1 story, 62 x 201 ft. service garage and repair shop at York Ave. and 63rd St. Estimated cost $350,000. Noted Feb. 19.

N. Y., New York—Dept. of Parks, will soon receive bids for the construction of a garage and shop, etc. at Bronx Park and Birdall Ave. Estimated cost $125,000. J. Dusenbury, 2382 Grand Concourse, Archt. Noted Feb. 19.

N. Y., New York—Rosario Gangi, 3978 Paulding Ave., plans the construction of a 3 story service garage at 225th St. and Paulding Ave. Estimated cost to exceed $50,000. F. J. Ross, 4200 White Plains Ave., Archt.

Pa., Erie — Erie Foundry Co., D. W. McDonald, Secy., 1253 West 12th St., plans the construction of a 1 story, 80 x 160 ft. machine shop on West 12th St. Estimated cost $40,000. Architect not selected. Maturity about June 1.

Pa., Mifflin—Bd. of County Commissioners, J. Armstrong, Chn., Pittsburgh, will receive bids until Mar. 10 for the construction of an airport, including 73 x 114 ft. administration building, 105 x 152 ft. hangar and 30 x 197 ft. auxiliary building here. Estimated cost $225,000. S. Roush, 519 Smithfield St., Pittsburgh, Archt.

Pa., Monessen—American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, plans the construction of a dock equipped with crane and crane runway, also dredging on Monongahela River here. Estimated cost exceeds $100,000.

Pa., Philadelphia—Ajax Metal Co., 46 Richmond St., will build a 2 story, 100 x 200 ft. warehouse at Frankford and Richmond Sts. M. W. Easby, Inc., 1505 Race St., Engrs. Work will be done by separate contracts.

Pa., Philadelphia—Philadelphia Electric Co., 10th and Chestnut Sts., awarded contract for the construction of a 1 story, 95 x 170 ft. plant at Taber and Adams Sts. Estimated cost $103,000.

R. I., Newport—Bureau of Yards & Docks, Navy Dept., is having plans prepared for addition to assembly plant at Naval Torpedo Station. Estimated cost $125,000. Private plans.

R. I., Pawtucket—Frank Cook Inc., 103 Exchange St., is receiving bids for a 1 story sales and service station on North Main St. Estimated cost $50,000. A. Addeo, 117 Broadway, Providence, Archt.

Tenn., Kingsport—Tennessee Eastman Corp., c/o Eastman Kodak Co., 343 State St., Rochester, N. Y., awarded contract for first unit of plant, 4 story, 100 x 580 ft. for the manufacture of cellulose acetate yarn, 2,500,000 lbs. annual capacity here. Estimated cost $1,000,000.

Tex., Camp Normoyle—U. S. Government c/o W. R. White, Constructing Quartermaster, plans theconstruction of a 3 story motor repair battalion barracks. Estimated cost $180,000.

Tex., Laredo—Gateway Chevrolet Co., is having plans prepared for the construction of a 2 story, 70 x 150 ft. garage and repair shop. Estimated cost $70,000: Private plans.

Newfoundland—American Smelting & Refining Co., 120 Broadway, New York, N. Y., plans doubling mill capacity, including smelter plant at Red Indian Lake. Estimated cost $500,000. Work will be done by day labor and separate contracts. Maturity indefinite.

N. S., Halifax—Neon Tube Gas & Electric Sign Co. Ltd., plans the construction of a plant.

Ont., Brockville—Cities Service Oil Co., Ltd., 1161 Yonge St., Toronto, awarded contract for a 1 story garage and service station on King St. here.

Ont., Kingston—Colonial Bus Lines, will soon receive bids for the construction of a garage and service shop. Estimated cost $25,000.

Que., St. Hyacinthe — Hump Hairpin Co., 1918 Prairie Ave., Chicago, Ill., plans the construction of a factory on Ste. Anne St. here. Estimated cost $125,000 to $150,000.

Que., St. Jerome—Viau Foundry Co., plans the construction of a new foundry building. Estimated cost $25,000.

SHOP MATERIALS AND SUPPLIES

METALS—Continued

	New York	Cleveland	Chicago
Aluminum ingots, 99%†	24.00@25.00	24.30	23.30
Zinc sheets (casks)	9.75@10.25	11.25	10.36
Solder (½ and ½)	22.00	21.50	18@20

Babbitt metal, delivered in case lots, New York, cents per lb.:

Genuine, highest grade	45.50
Commercial genuine, intermediate grade	34.50
Anti-friction metal, general service	29.00
No. 4 babbitt, f.o.b.	10.00

†F.O.B.

NICKEL AND MONEL METAL—Price in cents per lb., base, f.o.b. Huntington, W. Va.:

	Nickel	Monel Metal
Sheets, full finished	52.00	42.00
Sheets, cold rolled	60.00	50.00
Strip, cold rolled	55.00	45.00
Rods, hot rolled	45.00	35.00
Rods, cold drawn	50.00	40.00
Tubing	75.00*	90.00†
Angles, hot rolled	50.00	40.00
Plates	52.00	42.00

*Seamless. †Welded.

OLD METALS—Dealers' purchasing prices in cents per pound, f.o.b. cars:

	New York	Cleveland	Chicago
Crucible copper	8 00	7.75	7.25@ 7.75
Copper, heavy, and wire	7.25	7.50	6.75@ 7.25
Copper, light, and bottoms	6.25	6.50	6.00@ 6.50
Heavy lead	3.25	3.50	3.00@ 3.50
Lead battery plates	1.25	2.50	2.00@ 2.50
Brass, heavy, yellow	4.00	4.50	4.00@ 4.50
Brass, heavy, red	7.00	7.00	6.25@ 6.75
Brass, light	3.50	3.25	3.50@ 4 00
No. 1 rod-brass turnings	4.75	4.50	4.25@ 4.75
Zinc	1.50	1.50	1.25@ 1.50

TIN PLATES—Charcoal—Bright—Per box:

"AAA" Grade:	New York	Cleveland	Chicago
IC, 14x20	$12.1[illegible]	$11.95	$11.50
"A" Grade:			
IC, 14x20	9.[illegible]	9.90	9.50
Coke Plates—Primes—per box:			
100-lb., 14x20	6.45	6 10	7.00
Terne Plates—8-lb. Coating—Small lots—Per box:			
IC, 14x20	7.75@8.00	7 00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste white, per lb.	$0.13	$0.16	$0.15
Cotton waste, colored, per lb.	.09½	.12	.10
Wiping cloths, washed, white, per lb.	.15	38.00 per M	.14½
Sal soda, per lb.	.01½	.02	.02
Roll sulphur, per lb.	.028	.03	.04
Linseed oil, raw, in 1 to 4 bbl. lots, per lb.	.10	.099	.104
Cutting oil, about 25% lard, in 5 gal. cans, per gal.	.75	.60	.60
Machine oil, medium-bodied (55 gal. steel bbl.) per gal.	.33	.36	.24
Belting—Present discounts from list in fair quantities (½ doz. rolls) for leather or rubber:			
Leather—List price, 24c. per lin.ft., per inch of width, for single ply:			
Medium grade	30–10%	30–10%	50%
Med. grade, heavy wgt.	30%	30 –5%	40%
Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft.:			
First grade	70%	50–10%	60%
Second grade	65–5%	60– 5%	65%

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars	per lb.	$0.031	$0.031	$0.0325
Cold fin. shafting	per lb.	.034	.034	.034
Brass rods	per lb.	.15625	.1537½	.2125
Solder (½ and ½)	per lb.	.22	.2225	.2925
Cotton waste, white	per lb.	.13	.13	.13
Disks, aluminum oxide mineral, cloth, No. 1 6-in. dia.	per 100	4.59	4.59	4.59
Lard cutting oil	per gal.	.75	.75	.65
Machine oil	per gal.	.33	.33	.33
Belting, leather, medium	off list	30–10%	30–10%	30–10%
Machine bolts, up to 1x30 in., full kegs	off list	65–10%	65–10%	50–10%

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials — Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets:			
Flint paper*	$6.03	$6.03	$6.03
Emery cloth*	25.87	25.87	25.87
Disks, aluminum oxide mineral, 6 in. dia., No. 1, per 100:			
Paper†	2.61	2.61	2.61
Cloth†	4.59	4.59	4.59
Fire clay, per 100 lb. bag	1.00	.75	.75
Coke, prompt furnace, per net ton	Connellsville, 2.40@2.50		
Coke, prompt foundry, per net ton	Connellsville, 3.25@4.85		
White lead, dry	100 lb. kegs...	New York,	13.25
White lead, in oil	100 lb. kegs...	New York,	13.25
Red lead, dry	100 lb. kegs...	New York,	13.25
Red lead, in oil	100 lb. kegs...	New York,	14.75

*Less than 3 reams. †Less than 200.

SHOP SUPPLIES

Discounts from latest list, dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

Machine bolts:	
Up to ½-in. x 6-in., full kegs, list less	65–10%
Larger, up to 1 x 30-in., full kegs, list less	65–10%
Less than full kegs or case lots, add to list	10%
Fitting-up bolts: list less	45%
Lag screws:	
Up to ½-in. x 6-in., list less	65–10%
Larger, list less	65–10%
Less than full keg or case lots, add to list	10%
Rivets:	
Structural, round head, full kegs, net	$4.25
Structural, round head, broken kegs, net	5.75
Tank, $\frac{7}{16}$-in. dia. and smaller, list less	60–10%
Nuts:	
Hot pressed, square or hexagonal, blank or tapped:	
Full kegs up to 1-in., incl., list less	65–10%
Larger, up to 3-in., list less	65–10%
Less than keg or case lots, add to list	10%
Washers:	
Wrought, full kegs, per 100 lb., list less	$3.50
Wrought, broken kegs, per 100 lb., list less	1.50
Turnbuckles:	
With stub ends, list less	20–10%
Without stub ends, list less	55%
Chain:	
Proof coil, base, per 100 lb., net	$8 50
Cast iron welding flux, per lb., net	.35
Bronzing flux, per lb., net	.50

Supplement to AMERICAN MACHINIST, March 5, 1931.

A PLATFORM FOR AMERICAN BUSINESS

A Statement of Underlying Principles with some Practical Suggestions to Guide in Planning Future Progress

PRESENTED BY McGRAW-HILL PUBLISHING COMPANY, INC.

THE BUSINESS DEPRESSION of 1930 was no mere passing episode. The appalling loss and suffering entailed have struck home the more forcibly because they followed a period of unparalleled prosperity in a country that still possesses vast wealth and abundant resources. As a result of its duration and severity, the depression has shocked business, governmental and social agencies into commendable activity for the relief of human suffering and distress.

But, what is more significant for the future, it has also aroused an insistent demand for a searching analysis of the weak spots of the business and economic systems under which such a calamity was possible. It is an encouraging sign that men are beginning to question whether these recurring periods of boom and depression are not preventable; whether it is possible under better management to insure greater security to all classes of people who are willing to work; whether their faith in American achievement and standards of living can be preserved.

Evidence is multiplying that these questions can be answered in the affirmative; that this challenge to the American business and economic systems can be met in such a manner as to justify our confidence in them. Instead of regarding business depression as a storm to be weathered or a condition that must be endured and allowed to "work itself out," thinking men are beginning to look upon it as an economic plague that can be averted and wiped out by preventive measures. Sentiment is stirring in favor of doing something about it, heeding the warning of our latest experience and preparing actively to meet the issue it raises.

It is the responsibility of the business press to crystallize constructive policies and to encourage progressive leadership. Therefore, the McGraw-Hill Publishing Company desires to do its part in helping to clarify the situation and to stimulate thought and action. It believes in the philosophy of individual enterprise and cooperative effort on which American achievement has been based. And it has confidence in the ability of American management to recognize and adopt sound economic principles as a basis for constructive business policies. But it is equally certain that only by conscientious effort on the part of each business unit, large or small, can American business as a whole return to normal and pursue a steady course.

PLANNING IS ESSENTIAL for uninterrupted progress. To assist in such a program the McGraw-Hill Publishing Company offers through its publications the following principles and practical suggestions as a guide in formulating individual plans. They are not presented as a ready-made formula for success, but as a foundation on which business can be built with some protection from the shocks and dislocations that have plagued it.

GENERAL OBJECTIVES

The following general objectives are fundamental in planning sound business developments:

1. Maintenance of Established Standards of Living

The belief that there is danger of a general overproduction of wealth, that technical development necessarily involves unemployment, or that standards of living cannot be indefinitely increased is an economic fallacy. American business should not yield to it in any of the policies it pursues. Rather it must protect and preserve our economic standards and social traditions by maintaining high purchasing power and regularity of employment and dividend disbursements, based on more stabilized methods of management and financing made possible by long-term planning.

RECOMMENDATION: Conserve and add to the gains achieved in the past ten years through technical advance, improved forms of industrial organization and methods of management, and new devices for financing industrial and market expansion. Increase efficiency in the economic production and distribution of goods and services so as to facilitate their widest possible consumption and thereby raise the standard of living of the American people.

2. Stabilization of Future Business Growth

So long as there are wide fluctuations in business and in price levels, the gains to some groups are cancelled by losses to others and there is no net gain to the country as a whole. The interests of the speculative and creditor groups should be subordinated to the interests of those concerned with the production and distribution of goods and services. The latter should have a larger measure of leadership in business policy to insure sound and lasting prosperity.

This leadership can be exercised only by a more deliberate process of long term planning and organization for the direction and development of business operations. Such effort involves market analysis, sales control, product development, modernization of factory and office methods, foresight in purchasing, long-term financing of fixed capital requirements and a stimulated program of capital investment in 1931 for the restoration of business volume. All this must be supported by broader policies of coordination within the industry or trade, cooperation with labor and participation in the organized development of regional and national resources.

RECOMMENDATION: Direct individual and organized effort to check excessive and unbalanced industrial and financial expansion, and prevent wide changes in price levels. This will remove the incentive to speculative gain, avoid conflict of creditor and debtor groups, and promote confidence in long-term investment and borrowing. It will also encourage productive and commercial enterprise, maintain a steady increase in consumer purchasing power and stabilize business progress.

3. Promotion of International Business Cooperation

The world is economically interdependent. Though the United States is the dominant factor in world prosperity, she cannot maintain or increase her own prosperity indefinitely without sharing it with the world, nor can her business system survive unless, by sharing its benefits, the other nations of the world can preserve their faith in it. This calls for a more active policy of international cooperation on the part of American business to assist in the gradual reduction or removal of unnecessary trade barriers that interfere with the natural exchange of goods and services between peoples, the development of a more stabilized international mechanism for the movement of capital and control of credit, and the revision of war debts and reparations.

RECOMMENDATION: Support individual or organized effort to promote cooperation among business and financial interests of the United States and other countries, in order to facilitate the normal international movement of goods, services and capital, and thereby enhance economic stability at home and elevate standards of living abroad.

4. Encouragement of Private Initiative and Responsibility vs. Extension of Governmental Activity

American business should encourage self-government. It has already shifted enough of its responsibility and thereby yielded enough of its initiative to government and must stand its ground against further extension of governmental action in matters in which it can assume responsibility itself.

The essential function of government is to keep clear the field of economic activity for private business initiative and to assure a basis of fair and equal competition in domestic and foreign trade. It should refrain from competing with any kind of business itself. It should facilitate and encourage the development of necessary controls upon business through organized self government. It should safeguard the economic stability of the country by maintaining stability in its own fiscal and international policies. It should reduce to the minimum the number of laws affecting business.

RECOMMENDATION: Oppose governmental regulation, control or expenditure which tends to limit or weaken private individual initiative or cooperative effort, or to diminish the responsibility of the individual business concern or organized industry, for the accomplishment of the objectives stated above.

RESPONSIBILITY FOR ACTION

This course of action for (1) the maintenance and elevation of American standards of living, (2) the stable development of American business, (3) the promotion of international cooperation and (4) the restriction of governmental encroachment upon private initiative and cooperative effort cannot be carried out without the earnest participation of individuals and organized groups representing all types of business and industrial activity.

Upon the following major groups the main burden of responsibility rests:

A. Industrial and Business Management: A few thousand business concerns in this country employ the bulk of the wage-earners, originate most of the consumer income, and produce the chief part of the goods and services that determine the standard of living. Upon the management of these concerns therefore rests the main responsibility for action that will:

(1) Formulate long-term plans for research, production, distribution, purchasing and financing.

(2) Support cooperative effort through industrial, trade and commercial organizations.

(3) Maintain wage scales that permit a high standard of living and purchasing power.

(4) Maintain and equalize employment by adjustment of working hours.

(5) Establish a reserve to protect the security of employment in times of reduced production.

(6) Establish and maintain stable prices.

(7) Maintain reasonable, stable dividends, conserving surplus accumulated in periods of prosperity for such use in slack times.

B. Industrial, Trade and Commercial Organizations: The power of business units is multiplied and their leadership is strengthened by vigorous, intelligent and far-sighted trade organizations. Through them it is possible to carry the foregoing principles into action on an industry-wide basis, which is necessary to their realization in each industry as a whole and to the even balance among all industries requisite to stable progress. They should cooperate in:

(1) Collection of data on costs, stocks, production, potential productive capacity and market conditions.

(2) Interchange of credit information.

(3) Development of codes of practice.

(4) Establishment of standards of employment salaries and wages within the industry.

(5) Development of opportunities for stabilizing business.

(6) Study of market development.

(7) Economic development and use of natural resources.

C. Banking and Financial Institutions: Next to the will and intelligence of individual and organized business, the most important factor in achieving the four objectives of this platform is the understanding and cooperation of the banking system in checking excessive inflation in times of prosperity and excessive deflation in times of depression. In the exercise of this function, business itself may well expect banking and financial institutions to:

(1) Require business management to think in terms of long-time planning where financial assistance is provided.
(2) Encourage corporations to accumulate substantial reserves in good times to be used in slack times for development and dividends.
(3) Discourage the extension of excessive credit in periods of unusual prosperity and in like measure facilitate legitimate credit in times of stringency.
(4) Assist in the promotion of mergers where real benefits can be obtained but oppose the merging of corporations for stock selling purposes.
(5) Lead in the development of international financial cooperation.

D. Labor: Stability of industrial and business operations requires a sympathy by American workers with the policies expressed in this platform, and a willingness to cooperate in making them effective. Responsibility rests upon labor as well as upon management if the worker is to enjoy the benefits of our business system. To this end labor should actively support these principles:

(1) That increased wages are dependent upon increased efficiencies in production and distribution.
(2) That business must be conducted profitably if labor is to enjoy higher standards of living.
(3) That employers operating on a program of long-time planning provide the maximum stability of employment.
(4) That labor should demand of their leaders an understanding of sound business principles.
(5) That the welfare of labor will best be served by recourse to arbitration and the avoidance of industrial strife.
(6) That the development of international trade is essential to domestic prosperity.
(7) That the extension of governmental activity hampers business in assuming its social responsibilities.

E. Government: The essential function of government is to keep clear the field of economic activity for private business initiative and to assure a basis of fair and equal competition. It can best promote sound economic development through these policies:

(1) Refrain from competing with any kind of business itself.
(2) Encourage the development of the necessary control of business through self-government rather than by legislation.
(3) Safeguard the economic stability of the country by maintaining stability in its own fiscal and international policies.
(4) Exercise the greatest economy in public expenditures.
(5) Reduce to a minimum the number of laws affecting business.
(6) Cooperate with foreign nations for the fullest development of international trade.

AND IN CONCLUSION

THESE RECOMMENDATIONS can have value only as they are applied in the planning of individual company operations and in the programs of those industrial, commercial, financial and governmental agencies that are responsible for the conduct of our economic affairs. But taken broadly they constitute a platform of economic principles and business policies upon which far sighted management may well make a stand.

New conditions of our modern industrial civilization have laid new social responsibilities upon those men who guide the destinies of business enterprise. The protection of the welfare of workers and their security of employment and the assurance of permanent income to investors have become basic factors in the attitude of public opinion towards industry. And public opinion in the end has the power to preserve or to curtail that freedom of initiative around which the whole philosophy of American life has been organized.

Business management must meet the call of these responsibilities, therefore, if the people of the world are to be lifted out of the present depression and given assurance of greater stability of earning power in the future. Business leadership itself must strengthen and secure the success of this system of private initiative and cooperative effort upon which the prosperity of this country has been founded and of which it stands today as practically the sole exponent.

This proposed platform is being presented to American business through McGraw-Hill publications reaching into nearly every major industry in the country. It will be developed and interpreted editorially as a guide to the formulation of individual plans and business policies.

AS A FURTHER AID in that direction the reader will find within this supplement a check sheet of practical suggestions. Many of them are known to be practised by successful, well managed business concerns. It is believed that they will be of value and assistance to all American businessmen in planning for future progress and prosperity.

A CHECK SHEET of Practical Suggestions for Planning a Company Program

I—Long Term Planning of Business Operations

A. Definitely abandon the yearly period as the basis for business operations, except in accounting matters.

(1) Project business policies and planning, wherever possible, upon a three-year period or longer as a unit.

B. Initiate research from the customer's standpoint to determine:

Analyzing the Business

(1) To what extent established lines should be replaced, improved or simplified.
(2) What additional markets can profitably be penetrated with these lines.
(3) What new products can logically be added for present and new markets.

Appropriations made for this research should be distributed over a long enough period to carry

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Appropriations made for this research should be distributed over a long enough period to carry the project through without interruptions. (Some companies charge such appropriations to capital account just as they do the cost of a patent or a new building.)

Sales Control

C. Carry this long term planning into sales control, involving distribution methods, sales forecasting and pricing.

(1) Revise present methods of distribution and service to conform to the best interests of the customer. (*Example*—establishment of retail stores by mail order houses.)

(2) Prepare sales forecasts by products and by markets with regard to competition. (Leading institutions have found that modern sales forecasting can be correct within 2 to 3% for a year ahead and within 5 to 15% for three years ahead.)

(3) Know costs and stop selling at a loss. Maintain firm minimum prices based on production costs. (Business history shows a high degree of prosperity among those companies, large or small, which have had the courage to stand on a minimum price that insured a profit.)

(4) Plan sales organization, sales program and advertising on at least a three-year basis.

Production Modernization

D. Plan for uniform production as far ahead as possible on the basis of sales requirements already determined.

(1) Modernize and replace every existing production facility, including plants, factory and office equipment and methods where it is possible to effect cost reduction and greater production flexibility. (Stores, banks, and offices have a production problem no less than factories.)

(2) Do not expand production facilities in the mere hope for lower costs through larger production, but only where the long term forecast shows the necessity for additional facilities.

(3) Base purchase of materials, supplies and equipment upon the marketing and production program for the three-year period and make purchases as far ahead as practicable.

Financial Policies

E. Stabilize financing. Working capital requirements for labor and material, and business capital requirements for development and expansion, can be determined with reasonable accuracy for a period ahead by long term planning.

(1) Do not depend permanently upon bank credit for purposes other than short-term loans for current working capital. (In the interim partial payment financing of equipment, etc., is widely accepted as sound business practice.)

(2) Raise needed fixed capital requirements by bond or stock issues whenever reasonably advantageous.

(3) Invest surplus in short-term commercial paper or good bonds rather than employing it in call money or for purely speculative purposes.

Many of America's soundest corporations have adopted these financial policies.

Power

(c) In slack periods, preserve the organization of trained personnel by reducing hours of work per man rather than reducing number of employees.

(d) Set up a reserve to protect the security of employment in times of reduced production.

(2) A policy for dividends.

(a) Resist the temptation to pay out excessive sums in dividends in boom times. Rather place excess earnings in reserve and do not hesitate to use this reserve in slack times to maintain national purchasing power through dividend disbursements. (*Example*—U. S. Steel Corp. policy.)

(3) A policy for 1931 expenditures.

Business cannot return to normal until there is put into circulation for one year an additional amount of money equivalent to approximately $300 per employed person over the amount spent in 1930. If individual business initiative is to assume the responsibility of returning the country to normal then each employer must accept his quota. Where the volume of business does not warrant this increase in the form of operating expenses, the money may be placed in capital expenditures—modernization, research for development, new patents, etc.

B. Each business enterprise has a responsibility to aid in the development of regional and national resources.

Development of National Resources

(1) Encourage and cooperate in the coordination and promotion of the economic area in which you are located through constructive programs for the improvement of agricultural, commercial, industrial and community development. (*Example*—New England Council.)

(2) Assist in the work of national associations devoted to the improvement of business ethics, the promotion of higher standards in the commercial, industrial, financial and political administration of the country, and the simplification of the laws governing business. (*Example*—Chamber of Commerce of the United States.)

IV—Maintenance of World Business

Probably the greatest potential market for present and future American products lies in that foreign field represented by the present difference between the living standards of the American public and those of a billion and a half people in many other countries. Any slight increase in the living standards of these vast populations will bring immediate benefits to American manufacturers, as the largest producers of those commodities contributing to labor saving and luxury.

A. Support cooperative studies and formulation of world policies among business interests through international business organizations on such subjects as —

International Business Cooperation

(1) World tariffs.

(2) Trade discriminations.

(3) International movement of capital.

(4) War debts and reparations.

B. Promote uniformity in foreign trade practice by encouraging coordination among organized industries.

II—Coordination with Industry or Trade

A. The success of long term planning for an individual business is multiplied and secured when similar policies are established throughout the industry.

(1) Aid in the establishment and share in the active development of an industry, trade or commercial organization—

(a) to collect data on costs, stocks, production, potential productive capacity and market conditions.

(b) to interchange credit information.

(c) to develop codes of practice.

(d) to take full advantage of legal trade cooperation.

(2) Cooperate to establish standards of employment, salaries and wages within your industry. (Labor is particularly susceptible to advantages offered by a business where long-term planning gives stable employment.)

III—Promotion of National Prosperity

A. The net profits of a modern business depend not only on its own activities but on sustained business stability throughout the country. There is a vital responsibility upon each business enterprise to do its share to provide national stability of purchasing power through —

Stabilization of National Purchasing Power

(1) A policy for employment.

(a) Establish a minimum payroll based on the planned program of production and sales and consider this minimum payroll as a fixed charge on the business. (*Example*—the Procter & Gamble plan.)

(b) Maintain a salary and wage scale that permits a high standard of living and thus of purchasing power.

(c) In slack periods, preserve the organization of trained personnel by reducing hours of work per man rather than reducing number of employees.

(d) Set up a reserve to protect the security of employment in times of reduced production.

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